BID OF_____

2012

PROPOSAL, CONTRACT, BOND AND SPECIFICATIONS

FOR

WEST STREETS LIGHTING RETROFIT-2013

CONTRACT NO. 6946

IN

MADISON, DANE COUNTY, WISCONSIN

AWARDED BY THE COMMON COUNCIL
MADISON, WISCONSIN ON_____

PLEASE RETURN PLANS AND SPECIFICATIONS TO:

CITY ENGINEERING DIVISION
1600 EMIL STREET
MADISON, WISCONSIN 53713

www.cityofmadison.com/business/pw

WEST STREETS LIGHTING RETROFIT-2013
CONTRACT NO. 6946

INDEX

This Proposal, and Agreement have
been prepared by:

CITY ENGINEERING DIVISION
CITY OF MADISON
MADISON, DANE COUNTY, WISCONSIN

Robert F. Phillips, P.E., City Engineer

SECTION A: ADVERTISEMENT FOR BIDS

REQUEST FOR BID FOR PUBLIC WORKS CONSTRUCTION
CITY OF MADISON, WISCONSIN

A BEST VALUE CONTRACTING MUNICIPALITY

CONTRACT NO.	PROJECT NAME:
6946	WEST STREETS LIGHTING RETROFIT-2013

Plans and Specifications are available at 1600 Emil Street, Madison, WI 53713; 608-267-1197 or on our website at www.cityofmadison.com/business/pw/contracts/openforBid.cfm.

PREQUALIFICATIONS

Bidders who have not been prequalified by the City Engineer and Affirmative Action Director for the period of **February 1, 2012 to January 31, 2013** must submit their application on or before 1:00 p.m., OCTOBER 5, 2012**,** Room 115, City-County Building, Madison, WI 53703. Postmark is not applicable. Contractors be prequalified by the City Engineer including an affirmative action plan approved by the Affirmative Action Director prior to the bid opening or the bid will be rejected. Forms are available at the same location or on our website at www.cityofmadison.com/business/pw/forms.cfm.

OTHER REQUIREMENTS

Sealed bids must be accompanied with a Bid Bond equal to at least 5% of the bid or a Certificate of Annual/Biennial Bid Bond or certified check, payable to the City Treasurer.

Prevailing Wage Rates may be required and are attached in Section I of the contract. See Special Provisions to determine applicability.

Deadline for the Submittal of Bid is OCTOBER 12, 2012 by 1:00 PM, at 1600 Emil Street, Madison, WI 53713.

Bid Opening will be on OCTOBER 12, 2012 at 1:30 PM at 1600 Emil Street, Madison, WI 53713.

REQUEST FOR BIDS FOR PUBLIC WORKS CONSTRUCTION FOR THE CITY OF MADISON, WISCONSIN

A BEST VALUE CONTRACTING MUNICIPALITY

Plans and Specifications for Public Works Projects that are open for bid are available on the City of Madison website at http://www.cityofmadison.com/business/PW/contracts/openforBid.cfm or by calling City Engineering at 608-266-4751.

Sealed bids must be accompanied with a Bid Bond equal to at least 5% of the bid or a Certificate of Annual/Biennial Bid Bond or certified check, payable to the City Treasurer.

Prevailing Wage Rates may be required and are attached in Section I of the contract. See Special Provisions to determine applicability.

Bidders must be prequalified with the City Engineer and the Affirmative Action Director. Deadline date for submittal of application is noticed on our website. Forms are available on the web at http://www.cityofmadison.com/business/pw/forms.cfm or by contacting City Engineering at 608-266-4620

Publ. WSJ 9/28/12 & 10/5/12

SECTION B: INSTRUCTIONS TO BIDDERS

The City of Madison Standard Specifications for Public Works Construction - 2012 Edition, as supplemented and amended from time to time, forms a part of these contract documents as if attached hereto.

These standard specifications are available on the City of Madison Public Works website at www.cityofmadison.com/Business/PW/specs.cfm or by contacting City Engineering Division, Room 115, City-County Building, 210 Martin Luther King Jr. Blvd., Madison, WI 53703.

The Contractor shall review these Specifications prior to preparation of proposals for the work to be done under this contract, with specific attention to Article 102 **"BIDDING REQUIREMENTS AND CONDITIONS"** and Article 103 **"AWARD AND EXECUTION OF THE CONTRACT."** For the convenience of the bidder, below are highlights of three subsections of the specifications.

Section 102.1: Pre-Qualification of Bidders

In accordance with Wisconsin State Statutes 66.0901 (2) and (3), all bidders must submit to the Board of Public Works proof of responsibility on forms furnished by the City. The City requires that all bidders be qualified on a biennial basis.

Bidders must present satisfactory evidence that they have been regularly engaged in the type of work specified herein and they are fully prepared with necessary capital, materials, machinery and supervisory personnel to conduct the work to be contracted for to the satisfaction of the City. All bidders must be pre-qualified by the Board of Public Works for the type of construction on which they are bidding prior to the opening of the bid.

In accordance with Section 39.02(9)(a)l. of the Madison General Ordinances, all bidders shall submit in writing to the Affirmative Action Division Manager of the City of Madison, a Certificate of Compliance or an Affirmative Action Plan at the same time or prior to the submission of the proof of responsibility forms. The bidder shall be disqualified if the bidder fails to or refuses to, prior to opening of the bid, submit a Certificate of compliance, Affirmative Action Plan or Affirmative Action Data Update, as applicable, as defined by Section 39.02 of the Madison General Ordinances (entitled Affirmative Action) and as required by Section 102.11 of the Standard Specifications.

Section 102.4: Proposals

No bid will be accepted that does not contain an adequate or reasonable price for each and every item named in the Schedule of Unit Prices.

A lump sum bid for the work in accordance with the plans and specifications is required. The lump sum bid musts be the same as the total amounts bid for the various items and it shall be inserted in the space provided.

All papers bound with or attached to the proposal form are considered a part thereof and must not be detached or altered when the proposal is submitted. The plans, specifications and other documents designated in the proposal form will be considered a part of the proposal whether attached or not.

A proposal submitted by an individual shall be signed by the bidder or by a duly authorized agent. A proposal submitted by a partnership shall be signed by a member/partner or by a duly authorized agent thereof. A proposal submitted by a corporation shall be signed by an authorized officer or duly authorized registered agent of such corporation, and the proposal shall show the name of the State under the laws of

which such corporation was chartered. The required signatures shall in all cases appear in the space provided therefore on the proposal.

Each proposal shall be placed, together with the proposal guaranty, in a sealed envelope, so marked as to indicate name of project, the contract number or option to which it applies, and the name and address of the Contractor. Proposals will be received at the place and until the hour on the date designated in the advertisement. When sent by mail, the sealed proposal marked as indicated above shall be enclosed in an additional envelope. Proposals sent by mail, submitted in person or otherwise delivered must be in the hands of the official conducting the letting by the hour on the date designated in the advertisement. Proposals received after the date designated will be returned to the bidder unopened.

The Bidder shall execute form ERD-7777 (R.9/03), a part of these proposal pages and submit same with the bidder's proposal, if applicable. REFER TO PROPOSAL SECTION.

Section 102.5: Bid Deposit (Proposal Guaranty)

No proposal shall be considered unless either (i) it is accompanied by a bid deposit of the character and amount described in the Advertisement for Bids or (ii) a biennial bid bond in an amount and form acceptable to the City of Madison has been previously submitted.

Bid deposits of unsuccessful bidders shall be returned following the award of the contract by the Common Council. Bid deposit of the successful bidders shall be returned within forty-eight (48) hours following execution of the contract and bond as required.

Bidders for this Contract(s) must be Pre-Qualified for at least one of the following type(s) of construction denoted by an ☒

Building Demolition

- 101 ☐ Asbestos Removal
- 110 ☐ Building Demolition
- 120 ☐ House Mover

Street, Utility and Site Construction

- 201 ☐ Asphalt Paving
- 205 ☐ Blasting
- 210 ☐ Boring/Pipe Jacking
- 215 ☐ Concrete Paving
- 220 ☐ Con. Sidewalk/Curb & Gutter/Misc. Concrete Work
- 221 ☐ Concrete Bases and Other Concrete Work
- 225 ☐ Dredging
- 230 ☐ Fencing
- 235 ☐ Fiber Optic Cable/Conduit Installation
- 240 ☐ Grading and Earthwork
- 242 ☐ Infrared Seamless Patching
- 245 ☐ Landscaping, Maintenance
- 250 ☐ Landscaping, Site and Street
- 251 ☐ Parking Ramp Maintenance
- 255 ☐ Pavement Sealcoating and Crack Sealing
- 260 ☐ Petroleum Above/Below Ground Storage Tank Removal/Installation
- 265 ☐ Retaining Walls, Precast Modular Units
- 270 ☐ Retaining Walls, Reinforced concrete
- 275 ☐ Sanitary, Storm Sewer & Water Main Const.
- 280 ☐ Sewer Lateral Drain Cleaning/Internal TV Insp.
- 285 ☐ Sewer Lining
- 290 ☐ Sewer Pipe Bursting
- 295 ☐ Soil Borings
- 300 ☐ Soil Nailing
- 305 ☐ Storm & Sanitary Sewer Laterals & Water Svc.
- 310 ☐ Street Construction
- 315 ☐ Street Lighting
- 318 ☐ Tennis Court Resurfacing
- 330 ☐ Traffic Control During Construction
- 320 ☐ Traffic Signals
- 325 ☐ Traffic Signing & Marking
- 335 ☐ Trucking
- 399 ☐ Other_____

Bridge Construction

- 501 ☐ Bridge Construction and/or Repair

Building Construction

- 401 ☐ Floor Covering (including carpet, ceramic tile installation, rubber, VCT
- 402 ☐ Building Automation Systems
- 403 ☐ Concrete
- 404 ☐ Doors and Windows
- 405 ☒ Electrical - Power, Lighting & Communications
- 410 ☐ Elevator - Lifts
- 412 ☐ Fire Suppression
- 413 ☐ Furnishings - Furniture and Window Treatments
- 415 ☐ General Building Construction, Equal or Less than $250,000
- 420 ☐ General Building Construction, $250,000 to $1,500,000
- 425 ☐ General Building Construction, Over $1,500,000
- 428 ☐ Glass and/or Glazing
- 429 ☐ Hazardous Material Removal
- 430 ☐ Heating, Ventilating and Air Conditioning (HVAC)
- 433 ☐ Insulation - Thermal
- 435 ☐ Masonry
- 437 ☐ Metals
- 440 ☐ Painting and Wallcovering
- 445 ☐ Plumbing
- 450 ☐ Pump Repair
- 455 ☐ Pump Systems
- 460 ☐ Roofing and Moisture Protection
- 461 ☐ Solar Photovoltaic/Hot Water Systems
- 465 ☐ Soil/Groundwater Remediation
- 466 ☐ Warning Sirens
- 470 ☐ Water Supply Elevated Tanks
- 475 ☐ Water Supply Wells
- 480 ☐ Wood, Plastics & Composites-Structural & Architectural
- 499 ☐ Other_____

State of Wisconsin Certifications

1 ☐ Class 5 Blaster - Blasting Operations and Activities 2500 feet and closer to inhabited buildings for quarries, open pits and road cuts.

2 ☐ Class 6 Blaster - Blasting Operations and Activities 2500 feet and closer to inhabited buildings for trenches, site excavations, basements, underwater demolition, underground excavations, or structures 15 feet or less in height.

3 ☐ Class 7 Blaster - Blasting Operations and Activities for structures greater than 15 ' in height, bridges, towers, and any of the objects or purposes listed as "Class 5 Blaster or Class 6 Blaster".

4 ☐ Petroleum Above/Below Ground Storage Tank Removal and Installation (Attach copies of State Certifications.)

5 ☐ Hazardous Material Removal (Contractor to be certified for asbestos and lead abatement per the Wisconsin Department of Health Services, Asbestos and Lead Section (A&LS).) See the following link for application: http://www.dhs.wisconsin.gov/Asbestos/Cert/Index.htm. State of Wisconsin Performance of Asbestos Abatement Certificate must be attached.

6 ☐ Other_____

SECTION C: SBE

Instructions to Bidders
City of Madison
SBE Program Information

SBE (Not Applicable)

SECTION D: SPECIAL PROVISIONS

WEST STREETS LIGHTING RETROFIT-2013
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It is the intent of these Special Provisions to set forth the final contractual intent as to the matter involved and shall prevail over the Standard Specifications and plans whenever in conflict therewith. In order that comparisons between the Special Provisions can be readily made, the numbering system for the Special Provisions is equivalent to that of the Specifications.

Whenever in these Specifications the term "Standard Specifications" appears, it shall be taken to refer to the City of Madison Standard Specifications for Public Works Construction and Supplements thereto.

SECTION 102.10: MINIMUM RATE OF WAGE SCALE

For this project, payment of prevailing wages (white sheet) is not required if either: a single trade accounts for 85% or more of the total labor costs of the project and the bid is less than $48,000; or no single trade accounts for 85% or more of the total labor costs of the project and the bid is less than $100,000. For bids not meeting either of these conditions, prevailing wages shall be required.

If required, the wages and benefits paid on the contract shall not be less than those specified in the Prevailing Wage Determination included with these contract documents for the following types of work:

☒ Building and Heavy Construction
☐ Sewer, Water, and Tunnel Construction
☐ Local Street and Miscellaneous Paving Operations
☐ Residential and Agricultural Construction

All bidders are notified that all labor employed on City contracts must be paid in accordance with the minimum rate of wage scale included in the Contract Documents.

For the information of the employees working on the project, a copy of the wage scale included in the contract documents and the provisions of Section 66.0903(8) of the Wisconsin Statutes shall be kept posted by the employer and in at least one conspicuous and easily accessible place at the site of the project.

The Contractor shall keep weekly payroll records setting forth the name, address, telephone number, classification, wage rate and fringe benefit package of each employee who worked on such City project and all other projects the employee worked in the same period, and the Contractor must keep records of the individual time each employee worked on the project and for each day of the project. Such records shall also set forth the total number of hours of overtime credited to each such employee for each day and week and the amount of overtime pay received in that week. Such records shall, in addition, set forth the full weekly wages earned by each such employee and the actual hourly wage paid to that employee. The Contractor shall submit payroll records to the Engineer every week for those periods when work is being done on the project. Said submittal shall be within twenty-one (21) calendar days of the end of the Contractor's weekly pay period.

The Contractor shall ensure that employees shall be paid unconditionally and shall receive the full amounts accrued at the time of payment, computed at rates not less than those stated in the City of Madison "Minimum Rate of Wage Scale" and that each employee's rate shall be determined by the work that is done within the trade or occupation classification which should be properly assigned to such employee. Questions regarding an employee's classification or rate of pay within that classification, shall

be resolved by the practice that predominates in the industry and on which the trade or occupation rate/classification is based. Therefore, rate of pay, classification and work jurisdiction disputes shall be resolved by relying upon practices established by collective bargaining agreements and guidelines used in such determinations by appropriate recognized trade unions operating within the City of Madison.

The Contractor shall agree that the normal rate of wage paid to the Contractor's employees on other projects shall not be reduced or otherwise diminished as a result of the requirement to pay no less than the minimum rate of wage scale on a City project. Mulcting of employees on City projects by contractors, such as by kickbacks or other such devices, is prohibited.

These contract provisions shall apply to all work performed on the contract by the Contractor with its own organization and with assistance of laborers under its immediate superintendency and to all work performed by piecework or by subcontract. No laborer, worker, or mechanic shall be employed directly upon the site of the work except on a wage basis, but this shall not be construed to prohibit the rental of equipment from individuals.

In the event of a refusal by the Contractor to submit payroll records as required by the contract, the City of Madison shall have the option to cancel this contract and request the Surety to perform or to relet the balance of the work for bids, and in that event, to charge the Contractor for any loss which the City may incur thereby.

SECTION 102.12: BEST VALUE CONTRACTING

This Contract shall be considered a Best Value Contract if the Contractor's bid is equal to or greater than $51,500 for a single trade contract; or equal to or greater than $251,000 for a multi-trade contract pursuant to MGO 33.07(7).

ARTICLE 102.3 EQUAL BENEFITS REQUIREMENT (SEC. 39.07, MGO)

This provision applies to contracts executed by the City on July 1, 2012 or later, unless exempt by Sec. 39.07 of the Madison General Ordinances (MGO).

For the duration of this Contract, the Contractor agrees to offer and provide benefits to employees with domestic partners that are equal to the benefits offered and provided to married employees with spouses, and to comply with all provisions of Sec. 39.07, MGO. If a benefit would be available to the spouse of a married employee, or to the employee based on his or her status as a spouse, the benefit shall also be made available to a domestic partner of an employee, or to the employee based on his or her status as a domestic partner. "Benefits" include any plan, program or policy provided or offered to employees as part of the employer's total compensation package, including but not limited to, bereavement leave, family medical leave, sick leave, health insurance or other health benefits, dental insurance or other dental benefits, disability insurance, life insurance, membership or membership discounts, moving expenses, pension and retirement benefits, and travel benefits.

Cash Equivalent. If after making a reasonable effort to provide an equal benefit for a domestic partner of an employee, the Contractor is unable to provide the benefit, the Contractor shall provide the employee with the cash equivalent of the benefit.

Proof of Domestic Partner Status. The Contractor may require an employee to provide proof of domestic partnership status as a prerequisite to providing the equal benefits. Any such requirement of proof shall comply with Sec. 39.07(4), MGO.

Notice Posting, Compliance. The Contractor shall post a notice informing all employees of the equal benefit requirements of this Contract, the complaint procedure, and agrees to produce records upon request of the City, as required by Sec. 39.07, MGO.

Subcontractors. Contractor shall require all subcontractors, the value of whose work exceeds the single-trade minimum set forth in Sec 33.07(7)(b)5., MGO, to provide equal benefits in compliance with Sec. 39.07, MGO.

See Section 39.07 MGO for exemptions from this requirement. Exemptions from this requirement include a Contractor whose employees are under a collective bargaining agreement that was in effect prior to July 1, 2012, however, the Contractor must agree to propose to the applicable collective bargaining unit(s) that an equal benefit requirement consistent with this ordinance be incorporated into the next collective bargaining agreement or in the existing agreement upon amendment, extension or other modification that occurs after July 1, 2012.

SECTION 105.1: AUTHORITY OF THE ENGINEER

The Engineer shall resolve all questions which arise as to the quality and acceptability of materials furnished, work performed, manner of performance, rate of progress of the work, interpretation of the plans and Specifications, acceptable fulfillment of the contract, compensation, and disputes and mutual rights between Contractors under the Specifications. The Engineer shall determine the amount and quantity of work performed and materials furnished.

All decisions of the Engineer shall, when so requested, be rendered in writing. They shall be final and conclusive in all matters unless within ten (10) days after such decision the Contractor applies in writing to the Board of Public Works for a review of such decision.

Any change proposed by a Contractor in SBE subcontractors, vendors or suppliers from those SBEs indicated on the SBE Compliance Report must be approved by the Engineer and the City's Manager of the Affirmative Action Division (hereafter, AAD). When requested, such decision shall be rendered in writing. Such decisions shall be final and conclusive in all matters unless within ten (10) days after such decision the Contractor or the affected SBE applies in writing to the Board of Public Works for a review of such decision.

In the event the Engineer and the AAD disagree over the proper decision to be made regarding an SBE, the Mayor shall appoint a third person to resolve the disagreement, within 30 days of appointment. The decision thus rendered may be reviewed by the Board of Public Works upon request of the Contractor or the affected SBE as set forth in Sections 105.1 and 105.2 of the City's standard specifications.

SECTION 107.14 WEAPONS PROHIBITION

Contractor shall prohibit, and shall require its subcontractors to prohibit, its employees from carrying weapons, including concealed weapons, in the course of performance of work under this Contract, other than while at the Contractor's or subcontractor's own business premises. This requirement shall apply to vehicles used at any City work site and vehicles used to perform any work under this Contract, except vehicles that are an employee's "own motor vehicle" pursuant to Wis. Stat. sec. 175.60(15m).

SECTION 109.7
The contractor shall begin work on or before **January 14, 2013.** The total time of completion of the contract shall be **NINETY (90) CALENDAR DAYS**. Work shall begin only after start work letter is received. If it is desirable to begin work before the above-mentioned date, the contractor shall establish a mutually acceptable date with the City Engineer.

SECTION 01 00 01
GENERAL REQUIREMENTS

Contents

PART 1 – GENERAL

1.1. SCOPE

A. The work under this section includes general rules for the project. Included are the following topics:
   1. Lighting Retrofit in Streets Division Office on 1501 W Badger Rd. Work includes demolition of old lighting, installation of new fixtures, lighting control, wiring and all switches.
   2. This work is funded by FY 2013 monies. Therefore a contract won't be awarded before December 2012.

1.2. PRE-BID INFORMATION

A. Arrange site visits with city project manager.

1.3. CONTACTS

A. Send all pre-bid inquiries to the owner's project management

B. The City's designee for project management:
   Kay Schindel
   Company: City of Madison
   Address: Room 115, 210 Martin Luther King Jr. Blvd.
   Phone: 608-266-4668
   Email: kschindel@cityofmadison.com

C. The City's designee for architectural and engineering is:

Kay Schindel
Company: City of Madison
Address: Room 115, 210 Martin Luther King Jr. Blvd.
Phone: 608-266-4668
Email: kschindel@cityofmadison.com

D. The City's designee for commissioning is: Kay Schindel
Company: City of Madison
Address: Room 115, 210 Martin Luther King Jr. Blvd.
Phone: 608-266-4668
Email: kschindel@cityofmadison.com

1.4. QUALIFICATIONS OF BIDDER

A. By submitting the bid, the bidder certifies as to meeting the following requirements:

1. Has completed one or more projects of at least 50% of the size or value of the division of work being bid and the type of work completed is similar to that being bid. If a greater magnitude of experience is deemed necessary, other than size or value of the work, such requirements will be described in the appropriate technical section of these specifications.

2. Has access to all necessary equipment and has organizational capacity and technical competence necessary to do the work properly and expeditiously.

3. Maintains a permanent place of business.

1.5. WORK BY THE CITY AND CITY FURNISHED EQUIPMENT

A. All asbestos removal.

1.6. SALVAGE MATERIALS

A. No materials removed from this project shall be reused except as specifically noted below. All materials removed shall become the property of and shall be disposed of by the Contractor.

1.7. PROVISIONS FOR FUTURE WORK

A. Do not disconnect any electrical circuits that are part of the emergency power system. If such circuit is specified or labeled on drawings as to be disconnected or removed, verify with City project manager.

1.8. SPECIAL SITE CONDITIONS

A. Unless otherwise noted, construction operations shall be limited to the hours between 6:30 a.m. and 6:00 p.m., Mondays through Fridays, except for holidays. A request must be made to the City forty-eight hours in advance for approval of work days or hours other than those stated above. Compliance is required with the City of Madison Noise Ordinance.

B. A temporary field office and temporary toilets are not required. The Contractor's labor force may use City facilities upon approval by the City. The Contractor shall maintain the toilets and other spaces provided by the City in clean and sanitary condition at all times.

1.9. ALTERNATES

A. Not Applicable

1.10. GENERAL

A. The City of Madison Standard Publications for Public Works Construction – current Edition, as supplemented from time to time, forms a part of these contract documents as if attached hereto. These Standard Specifications are available upon request form the City Engineer, City Engineering Division, Room 115, City County Building, 210 Martin Luther King Jr. Blvd., Madison, WI 53710. An electronic copy is available from the City Website http://www.cityofmadison.com/business/pw/specs.cfm. The Contractor shall review these specifications prior to

preparation of proposal for the work to be done under this contract. Failure to do so does not relive the Contractor from meeting all requirements.

B. All articles in these General Requirements are applicable to all Divisions and Sections apply to each Division of these Specifications as fully as if repeated within that Division. The Conditions of the Contract, General and Supplementary General Conditions, and these General Requirements shall apply to the Contractor and engaged in this work. Items listed under Scope of Work for each Division of the Specifications are not necessarily all inclusive.

C. Portions of these specifications are of the abbreviated, simplified type and may include incomplete sentences. Omissions of words or phrases such as "the Contractor shall", "in conformity with", "shall be", "as noted on the drawings", "in accordance with details", are intentional. Omitted words or phrases shall be supplied by inference in the same manner, as they are when a note occurs on the drawings. Such terms as approved, reviewed, equal, as directed, as required, as permitted, acceptable, satisfactory mean by or to the City Engineer or designee.

D. These specifications and drawings are intended to include everything necessary to perform the entire work properly. Every item necessarily required might not be specifically mentioned or shown. Unless expressly stated, all systems and equipment shall be complete and operable. All devices and installation methods necessary for a functioning system are considered included in this contract even if a detail is missing or unclear. The words "furnish", "install", and "provide" shall mean the same in a sense that the Contractor shall furnish and install all the necessary materials, apparatus, and devices to complete the equipment and systems installation herein specified, except such parts as are specifically exempted herein. This also includes that the contractor demolishes and disposes of an existing item if demolition is required to install the new item, even if demolition drawings or specification don't mention demolition of the specific item. If an item is either called for in the specifications or shown on the plans, it shall be considered sufficient for the inclusion of said item in this contract. If a conflict exists within the Specifications or exists within the Drawings, the Contractor shall furnish the item, system, or workmanship, which is the highest quality, largest, largest quantity or most closely fits the City's intent. Materials and labor shall be new (unless noted or stated otherwise), first class, and workmanlike, and shall be subject at all times to the City's or designee's inspections, tests and approval from the commencement until the acceptance of the completed work. Whenever a particular manufacturer's product is named, it is intended to establish a level of quality and performance requirements unless more explicit restrictions are stated to apply. It must be understood that the details and drawings are diagrammatic. The Contractor shall verify all dimensions at the site and be responsible for their accuracy. If items are too large to fit into existing space Contractor shall provide smaller model of same type upon approval by The City at no cost to the City. All sizes as given are minimum except as noted. Prior to bidding, bidder must visit site to become familiar and verify existing conditions. Failure to do so does not relieve the bidder from the responsibility to verify existing conditions, to point out errors in drawings or specifications or code violations.

E. Prior bidding, bidder must obtain information on payment conditions, discounts, shipping charges, and other cost from vendor and/or manufacturer of the products specified. Payments will be made based on progress of work. No payments will be made for occurred overhead cost that did not materialize in actual installation. Examples of cost to the contractor that is not part of partial payment are project management cost, bond cost etc. These cost will be covered proportionally for actual work done on site. No payments shall be made for material ordered. The Contractor is responsible for providing the Owner partial payment applications on form AIA Document G702 Application for Payment and AIA Document G703 Continuation Sheet (with schedule of values). Before the first Application for Payment, the Contractor shall submit to the A/E a schedule of values of the various portions of the Work, including quantities if required by the A/E aggregating the total Contract Sum, divided so as to facilitate payments to Subcontractors. Prepare a schedule of values in such form and supported by such substantiating data as the A/E and Owner may require. Each item in the schedule of values shall include its proper share of overhead and profit. This schedule, when approved by the A/E, shall be used only as a basis for reviewing the Contractor's Applications for Payment.

F. Bidders shall bring inadequacies, omissions or conflicts to the City's attention at least ten (10) days before the date set for bid opening. Prompt clarification will be supplied to all bidders of record by addendum. Failure to request clarification or interpretation of the drawings and specifications will not relieve the successful Bidder of responsibility. Signing of the contract will be considered as implicitly denoting that the Contractor has thorough understanding of the scope of work and comprehension of the contract documents. The City is not responsible for verbal instructions.

G. Information pertaining to existing conditions that are described in the specifications or appear on the drawings is based on available records. While such data has been collected with reasonable care, there is no expressed or implied guar-

antee that conditions so indicated are entirely representative of those actually existing. This information is provided to inform the Contractor of known, existing conditions so that due diligence is taken by the Contractor to avoid damage. Where site observation or documents indicate existing underground utilities/services in close proximity (within four feet horizontally and/or four feet vertically) to necessary new construction work, the Contractor shall be responsible to test, probe or otherwise determine exact locations so as to prevent damage to such utilities/services.

H. The Contractor resumes responsibility for all work specified in this contract except for work explicitly noted as be done by the City or a Contractor separately hired by the City. The Contractor shall immediately inform the City of the name of the person(s) designated as Superintendent representing the Contractor at the site.

I. The Contractor shall take complete charge of the work under this contract and coordinate the work of all trades on the project. All Contractors shall work in cooperation with the Contractor and with each other, and fit their work into the structure as job conditions may demand. The City shall make all final decisions as to the right-of-way and run of pipe, ducts, etc., at prearranged meetings with responsible representatives of the Contractors involved. Contractor(s) shall coordinate the work with adjacent work with other Contractors prior to installation and shall cooperate with all other trades to facilitate the general progress of the work. The Contractor shall coordinate and schedule the work of all its subcontractors, and shall furnish all information required by them for proper scheduling and execution of the work. In the same manner, the Contractor shall coordinate the work with that of the City, and any other Contractor operating in the area, including reasonable adjustments of schedule in order to allow other Contractors or the City to do their work. Coordinate all work with other Contractors prior to installation. Any installed work that is not coordinated and that interferes with other Contractor's work shall be removed or relocated at the installing Contractor's expense.

J. Each trade shall afford all other trades every reasonable opportunity for the installation of their work and for the storage of their material. In no case will the Contractor(s) be permitted to exclude from the premises or work, any other Contractor or employees thereof, or interfere with any other Contractor in the executing or installation of their work. In case it is indicated which trade is responsible for which work, this is meant as a suggestion and it is the Contractor's responsibility in its contracts with subcontractors to clarify who ultimately will do the work. If conflicts arise between the Contractor and subcontractor about who is responsible for which work to be done it is the Contractor's responsibility to make sure the work gets done in time even if the dispute between Contractor and subcontractor gets settled later.

K. The City Engineer shall have the right to make final and binding decisions on disputes between the Contractor and any other subcontractor operating in the area regarding: (a) access to the site with work force, equipment, and/or materials to their work area or (b) their adjacent work areas.

L. The Contractor shall cooperate with other trades and City personnel in locating work in a proper manner. Should it be necessary to raise or lower or move longitudinally any part of the electrical or piping or ducting work to better fit the general installation, such work shall be done at no extra cost to the City.

M. The area to be set aside for the work under this contract is shown on the drawings, and the Contractor shall confine the construction to the immediate area within the construction limits. The Contractor shall immediately upon entering the site for purpose of beginning work, locate general reference points and take such action as is necessary to prevent their destruction. The Contractor shall lay out its work and be responsible for all lines, elevations and measurements of the building and other work executed under its Contract. The Contractor must exercise proper precaution to verify dimensions on the drawings before laying out work and will be held responsible for any error resulting from failure to exercise such precaution. The Contractor shall verify grades, lines, levels, locations, and dimensions as shown on drawings and report any errors or inconsistencies to the City before commencing work. Starting of work by the Contractor shall imply acceptance of existing conditions. Confine all operations, equipment, apparatus and storage of materials, to the immediate area of work to the greatest possible extent. Contractor shall ascertain, observe and comply with all rules and regulations in effect on the project site, including but not limited to parking and traffic regulations, use of walks, security restrictions and hours of allowable ingress and egress. Any special traffic control during construction involving lane closures shall be in accordance with the federal standard, Manual of Uniform Traffic Control Devices.

N. Using datum, the lot lines and present levels have been established as shown on the drawings. Other grades, lines, levels and benchmarks, shall be established and maintained by the Contractor, who shall be responsible for them. As work progresses, the Contractor shall lay out on forms and floor, the locations of all partitions, walls and fix column centerlines as a guide to all trades. The Contractor shall make provision to preserve property line stakes, benchmarks,

or datum point. If any are lost, displaced or disturbed through neglect of any Contractor, Contractor's agents or employees, the Contractor responsible shall pay the cost of restoration.

O. The City will not furnish Watchpersons. The Contractor shall provide such precautionary measures, to include the furnishing of watchpersons if deemed necessary, to protect persons and property from damage or loss where the Contractor's work is involved. The contractor is responsible for securing any material stored on site. In case of theft or damage

P. Contractors shall cooperate with all the testing consultants and verify system completion to the testing consultants. Demonstrate the starting, interlocking and control features of each system so the testing Contractor can perform its work.

1.11. SAFETY, HEALTH AND ENVIRONMENT

A. Contractor shall provide in the performance of the work under this subcontract all labor, materials, equipment, services and supervision required to maintain work sites that meet the environment, safety and health (ES&H) requirements of all applicable federal, state, and local regulations and protect the environment and the safety and health of its employees, the employees of its lower tier subcontractors, City employees and the general public.

B. The contractor shall provide a qualified onsite Health and Safety Representative with the authority to enforce all of the safety requirements of this subcontract and implement the contractor's Injury and Illness Prevention Program and Hazard Abatement Plan. This may be a contractor supervisor, foreperson or project manager. The contractor shall remove and replace its Health and Safety Representative at the request of the Project Representative, if the Safety Representative is unsuccessful in enforcing the safety requirements of this subcontract and maintaining hazard free worksites. The contractor's onsite health and safety representative shall conduct safety inspections of the project operations, materials, and equipment frequently throughout the day to ensure that all safety deficiencies are identified and corrected. The city reserves the right to enforce measures if it feels the contractor's onsite health and safety representative does not enforce all requirements. Inspection findings and corrective actions taken shall be documented, and the record shall be kept on the construction work site and be made available to the Project Manager upon request.

C. The City Engineer and/or assigned delegates will periodically monitor the contractor's compliance with the EH&S requirements of this subcontract. If safety deficiencies are found, the Project Representative will issue a Safety Deficiency Notice to the contractor. Upon receipt of a written Safety Deficiency Notice from the Owner, the contractor shall take appropriate action to correct the deficiency and discontinue the hazardous activity until the hazard is abated. Failure to correct or eliminate violation(s) within the period specified might result in the CITY stop all or any part of the work. The contractor shall submit to the Project Representative a written response to the Safety Deficiency Notice describing what corrective action it has taken, the date such corrective action was completed and actions that it will take to prevent future recurrence of the same incident.

D. The contractor shall prepare a written comprehensive injury and illness prevention program for its employees and all lower tier Subcontractor employees as required by this contract's specified EH&S standards, and regulations and submit it to the Project Representative for review. Field activities shall not start on this project until the project representative has favorably reviewed the program. Subsequent revisions shall be submitted to the Project Representative for review prior to commencement of affected work.

E. The required comprehensive program shall include but not be limited to:
   1. Confined Space Entry
   2. Site specific Emergency Response, First Aid, & Medical Services. Identify employees with CPR/First Aid certification available at the work site.
   3. Fire Protection and Prevention
   4. Hazard Communications
   5. Hazardous Waste Operations
   6. Hazardous Work Permits
   7. Toxic and Hazardous substances
   8. Inspection, Maintenance, and Certification of Heavy Equipment, Cranes, and Motor Vehicles
   9. Lock Out/Tag Out (LOTO) Subcontractors are required to include LOTO
   10. Personal Protective and Life Saving Equipment
   11. Radiation Protection

12. Construction Safety Training
13. Control of silica dust released during demolition or drilling of concrete or released from work with other materials that contain silica.

F. ACTIVITY HAZARD ANALYSIS AND HAZARD ABATEMENT PLAN:
1. In addition to the Injury and Illness Prevention Program the Subcontractor shall prepare and submit for review by the Project Representative a written Activity Hazard Analysis for each phase of construction in this contract.
2. The Activity hazard Analysis shall provide the following information:
   a) Description of work phase or activity
   b) Identification of potential hazards associated with the activity
   c) A list of the contractor's planned controls to mitigate the identified hazards
   d) Name of the contractor's employee responsible for inspecting the activity and ensuring that all proposed safety measures are followed
   e) Construction activities for which an Activity Hazard Analysis and Hazard Abatement Plan may be required include, but are not limited to:
   f) Roofing
   g) Hoisting and handling of materials
   h) Excavations
   i) Trenching and drilling
   j) Concrete placement and false work
   k) Welding
   l) Steel erection
   m) Work performed six feet or higher above ground
   n) Electrical work
   o) Demolition
   p) Work in confined spaces
   q) Work that causes the release of silica such as demolition or drilling of concrete or work with materials that contain silica.
   r) Work with epoxy coatings
   s) Work with or around hazardous materials
   t) Work on hilly terrain
   u) Use and handling of flammable materials
3. The City Project Representative must favorably review the Activity Hazard analysis and Hazard Abatement Plan before work can start on that activity.

G. Energized electrical work within panels and equipment is not allowed.

H. Workers shall be qualified to perform electrical tasks in accordance with OSHA 29 CFR 1910 and 1926 requirements.

I. Work practices must be compliant with NFPA 70E, 2004 – Standard for Electrical Safety in the Workplace.

J. Rubbish, debris and scrap shall not be thrown through any window or other opening, or dropped from any great height; it shall be conducted to the ground, to waiting truck(s) or removable container(s) by means of approved chutes or other means of controlled conveyance.

K. Form and scrap lumber shall have all nails withdrawn or bent over; shall be neatly stacked, placed in trash bins, or removed from the premises.

L. Spillages of oil, grease or other liquids, which could cause a slippery or otherwise hazardous situation or stain a finished surface, shall be cleaned up immediately.

M. Verify that all gas and electrical utilities have been abandoned or disconnected and associated hazards mitigated, prior to beginning any demolition.

N. Take all necessary precautions while dismantling piping containing gas, gasoline, oil or other explosive or toxic fluids or gases. Purge lines and contain materials in accordance with all applicable regulations. Store such piping outdoors until fumes are removed.

O. All material classified by authorities to be a material that needs special treatment must be recycled, reused or disposed off by a special contractor that holds a valid license to work with such material. If hazardous materials are not anticipated, but encountered, terminate operations and contact the CITY Construction Representative immediately.

P. Control of Crystalline Silica Dust: The subcontractor shall provide all necessary control measures at the work site to keep worker exposure to crystalline silica dust within the OSHA Established Permissible Exposure Limits (PEL's). Dust control measures may require spraying of water or engineering controls at the dust generating points. It also may include the use of respirators, industrial grade HEPA vacuums, and HEPA filtered locally exhausted tools. Construction operations known to cause the release of silica dusts include, but are not limited to:
    1. Chipping, sawing, grinding, hammering, and drilling of concrete, rock, or brick.
    2. Work with cementitious materials such as grout, mortar, stucco, gunnite, etc.
    3. Dry sweeping of dust originating from concrete or rock

Q. Each employee scheduled to work in the activities identified above shall receive safety training in those activities prior to working on them. The Subcontractor shall maintain proof of employee training at the work site and make it available to the Project Representative upon request. The favorably reviewed project Hazard Abatement Plan shall be maintained on the work site and shall be made available, upon request, to work site employees and the Project Representative.

R. WORK SITE SAFETY ORIENTATION:
    1. Each employee shall receive initial EH&S orientation prior to performing any work on the project. The contractor shall maintain on the work site a detailed outline of the orientation and a signed and dated roster of all employees who have completed the project EHS indoctrination. Make documentation available to Project Representative on request.
    2. The orientation shall, at a minimum, cover the following points:
    3. Employee rights and responsibilities.
    4. Construction contractor responsibilities.
    5. Alcohol and drug abuse policy
    6. Contractor's disciplinary procedures.
    7. First aid and medical facilities.
    8. Site and project specific hazards.
    9. Hazard recognition and procedures for reporting or correcting unsafe conditions or practices.
    10. Procedures for reporting accidents and incidents.
    11. Fire fighting and other emergency procedures to include local warning and evacuation systems.
    12. Hazard Communication Program.
    13. Access to employee exposure monitoring data and medical records.
    14. Protection of the environment, including air, water, and storm drains from construction pollutants.
    15. Location of and access to reviewed project Illness and Injury Prevention Program, Hazard Analysis and Hazard Abatement Plan
    16. Location and contents of required postings

S. Construction Activity Pollution Prevention:
    1. Follow Requirements in Storm Water Pollution Prevention Plan (SWPPP) and Erosion and Sedimentation Control (ESC) Plan
    2. Stabilize any relocated and moved soil with fast growing grasses and place mulch (hay, woodchips, straw) on it to cover and hold soil
    3. Divert surface runoff from distributed areas into sediment basin or sediment traps with a mound of stabilized soil
    4. Construct posts with filter fabric media to remove sediment from stormwater leaving the site.

T. Site Development: Follow requirements in site development plan and don't disturb areas beyond the marked areas

U. Indoor Air Quality:

1. During construction the recommended control measures of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) IAQ guidelines for occupied buildings under construction, (1995, chapter 3) must be met or exceeded.
2. Stored on-site or installed absorptive material must be protected from moisture damage.
3. In case permanently installed air handlers are used for ventilation, filtration media with a Minimum efficiency Reporting Value (MERV) of 8 shall be used at each return air grille, as determined by ASHRAE 52.2-1999. Contractor shall replace all filtration media immediately prior occupancy.
4. All to be installed ductwork, air handlers and other equipment later connected to the indoor air path are to be protected from dirt and debris.

1.12. GUARANTEES

A. All work, material and equipment is guaranteed by the Contractor to be free of faults for at least one year or longer if specified elsewhere. This year begins from the date of final acceptance from the City. The Contractor agrees to return to the project and commence work as directed upon notification by the City and will furnish at his own expense all necessary labor and material to make proper repairs or corrections made necessary by defective material or inferior workmanship furnished or performed under this contract. If a subcontractor is not complying, the Contractor is held responsible.

B. All corrections and repairs are to be made no more than 30 days after notification of the Contractor for equipment and material that is not critical to the operation of the building. Critical equipment and material, including but not limited to HVAC, roofing, electrical, elevator, shall be repaired or brought into temporary and safe working condition in less than 7 days and temporary alternatives have to be provided by the Contractor if function is critical for use of the facility. If Contractor fails to do so the City reserves the right to perform the work himself or subcontract a different Contractor and charge the Contractor the full cost of the repair and correction and cost of any material, rental fee, labor and equipment to provide temporary relief and protection to enable safe operation of the building.

C. All equipment and material warranty by the manufacturer that lasts longer than the 1-year warranty by the contractor requires sufficient documentation acceptable by the manufacturer to honor the warranty beyond the first year. documents required include manufacturer's warranty certification for this specific material and equipment at the job site, purchase orders or any other documents that will be required beyond the first year for the manufacturer to honor warranty.

1.13. SCHEDULE OF OPERATIONS

A. Within 5 calendar days after the effective date of Start Work Letter, the Contractor shall provide a critical path method (CPM) network diagram and a preliminary construction progress schedule covering Contractor operations for the first 60 calendar days. The diagram shall show the order in which the Contractor proposes to accomplish the work. The CPM shall show interdependence and duration, along with installation man-hours by craft of each activity. Any work element longer than 15 days shall be broken down into component parts. The critical path and float for each activity shall also be shown. The diagram or bar chart shall be neatly lettered and legibly drawn to a time scale. The preliminary progress schedule shall be a bar graph or an arrow diagram showing the times the Contractor intends to commence and complete the various work stages, with operations and contract items planned to start during the first 60 calendar days. This initial network diagram and all consecutive versions shall include preliminary dates throughout the end of the project.

B. Install work in phases to accommodate City's occupancy requirements. During the construction period coordinate electrical schedule and operations with the City.

C. After the initial submittal, the Contractor shall update the schedule monthly by entering actual progress for the period and submit copies as part of the payment request.

D. Contractor shall maintain and provide a 6-week construction schedule that is compatible and complimentary to the general CONSTRUCTION SCHEDULE, and shall include detail of daily tasks over a 6-week period to be updated weekly and communicated and coordinated at the weekly Trade Meetings by the Contractor's field supervisor.

E. Include tests and other commissioning activities in schedule

1.14. DOCUMENTS

A. All electronic files used or created for this project become property of the City. All files have to be submitted to the City upon request and once each phase (design, construction) is completed. Only Microsoft Office, PDF, and AutoCAD version 2008 and lower documents are acceptable. All documents that once existed in Microsoft or AutoCAD version must be submitted in such. AutoCAD files have to be submitted in original drawing form for further use in future projects. Sheet-set files alone will not be sufficient. All AutoCAD files must be submitted as PDF in addition. The Contractor can use CAD files and other files necessary for this project upon request.

B. The City or designee will provide the Contractor with a suitable set of Contract Documents on which daily records of changes and deviations from contract shall be recorded. Dimensions and elevations on the record drawings shall locate all buried or concealed piping, conduit, or similar items.

C. The daily record of changes shall be the responsibility of Contractor's field superintendent. No arbitrary mark-ups will be permitted. During the first week of each month, the Contractor shall present, at the project site, the job copy showing variations and changes to date to the City for review.

D. During first week of each month, the Contractor shall present at the project site all changes to architectural/engineering plans for review. At completion of the project, the Contractor shall submit the marked-up record drawings to the City prior to final payment.

E. Contractor shall provide list with all equipment installed. This list shall contain, but not limited to, type, make and special product key and number. For grant purposes the contractor may have to provide detailed information about equipment installed and labor provided to third party institutions, such as Focus on Energy.

F. Electronic design files may be provided by the owner at it s digression as they are needed for the contractor to perform the work. Contractor shall use electronic design files on their own risk and assume all liability. Electronic documents are not contract documents and significant discrepancies may exist between these electronic files and contract documents and actual site conditions.

1.15. QUALITY ASSURANCE

A. Any installed material not meeting the specification requirements must be replaced with material that meets these specifications without additional cost to the City.

B. All products and materials used are to be new, undamaged, clean and in good condition. Existing products and materials are not to be reused unless specifically indicated.

C. Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the Contractor is responsible for all costs involved in integrating the equipment or accessories into the system and for obtaining the performance from the system into which these items are placed. This may include changes found necessary during the testing, adjusting, and balancing phase of the project.

D. Welding procedures, welders, and welding operators for all building service piping to be in accordance with certified welding procedures of the National Certified Pipe Welding Bureau and Section 927.5 of ASME B31.9 Building Services Piping or AWS 10.9 Qualification of Welding Procedures and Welders for Piping and Tubing. Before any metallic welding is performed, Contractor to submit his Standard Welding Procedure Specification together with the Procedure Qualification Record as required by Section 927.6 of ASME B31.9 Building Services Piping. Before any metallic welding is performed, Contractor to submit his Standard Welding Procedure Specification together with the Procedure Qualification Record as required by Section IX of the ASME Boiler and Pressure Vessel Code and/or the National Certified Pipe Welding Bureau. Before any polyethylene fusion welding is performed, Contractor to submit certification that the welders to be used on this project have successfully demonstrated proper welding procedures in accordance with the Code of Federal Regulations, Title 49, Part 192, Section 192.285.

E. Contractor shall assume the responsibility for the protection of all finished construction under the Contract and shall repair and restore any and all damage of finished work to its original state. Wheeling of any loads over any type of floor, either with or without plank protection, will be permitted only in rubber-tired wheelbarrows, buggies, trucks or dollies. Where structural concrete is also the finished surface, care must be taken to avoid marking or damaging those

surfaces. All structures and equipment shall be constructed, installed and operated with guards, controls and other devices in place.

F. Contractor shall obtain complete data at the site and inspect surfaces that are to receive the Work before proceeding with fabricating, assembling, fitting or erecting any work under this contract. Contractor shall notify the City in writing in case of discrepancies between existing work and drawings, and of any defects in such surfaces that are to receive the Contractor's work. The City will evaluate the notice and direct what remedial action will be taken.

G. Starting of work implies acceptance of existing work or the work of others. Removal and replacement of work applied to defective surfaces, in order to correct defects, shall be done at the expense of the Contractor who applied work to defective surfaces.

H. The Contractor shall:

1. Provide, erect and maintain all required planking, barricades, guard rails, temporary walkways, etc., of sufficient size and strength necessary for protection of stored material and equipment; paved surfaces, walks, curbs, gutters and drives; streets adjacent to or within project area; adjoining property and all project work to prevent accidents to the public and the workmen at the job site.
2. Notify adjacent property owners if their property interferes with the work so that arrangements for proper protection can be made.
3. Provide and maintain proper shoring and bracing to prevent earth from caving or washing into the building excavation. Provide temporary protection around openings through floors and roofs, including elevator openings, stairwells, and edge of slabs.
4. Provide and maintain proper shoring and bracing for existing underground utilities, sewers, etc., encountered during excavation work, to protect them from collapse or other type of damage until such time as they are to be removed, incorporated into the new work, or can be properly backfilled upon completion of new work.
5. Provide protection against rain, snow, wind, ice, storms, or heat to maintain all work, materials, apparatus, and fixtures, incorporated in the work or stored on the site, free from injury or damage. At the end of the day's work, cover all new work likely to be damaged. Remove snow and ice as necessary for safety and proper execution of the work.
6. Protect the building and foundations from damage at all times from rain, ground water and back up from drains or sewers. Provide all equipment and enclosures as necessary to provide this protection.
7. Damaged property shall be repaired or replaced in order to return it to its original condition. Damaged lawns shall be replaced with sod.
8. Protect materials, work and equipment, not normally covered by above protection, until construction proceeds to a point where the general building protection of the area where located, dispenses with the necessity therefore. Protect work outside of the building lines such as trenches and open excavations, as specified above.
9. Take all necessary precautions to protect the City's property as well as adjacent property, including trees, shrubs, buildings, sanitary and storm sewers, water piping, gas piping, electric conduit or cable, etc., from any and all damage which may result due to work on this project.
10. Repair work outside of property line in accordance with the requirements of the authority having jurisdiction.
11. Repair any work, damaged by failure to provide proper and adequate protection, to its original state to the satisfaction of the City or remove and replace with new work at the Contractor's expense.
12. Protect trees indicated on the drawings to remain and trees in locations that would not interfere with new construction, from all damage. Do not injure trunks, branches, or roots of trees that are to remain. Do cutting and trimming only as approved and as directed by the City. The value of trees destroyed or damaged will be charged against the account of the Contractor responsible for the damage in an amount equal to the expense of replacing the trees with those of similar kind and size.

I. The contractor shall be fully responsible for inspecting the work of its suppliers, and subcontractors to assure that the work complies with the standards for materials and workmanship required by the contract documents.

J. The Contractor shall:

1. Monitor quality control over subcontractors, suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of the quality specified in the contract documents.
2. Comply fully with manufacturer's instructions, including each step in sequence.
3. Request clarification from the City before proceeding with work when manufacturers' instructions or reference standards conflict with Subcontract Documents.

4. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or manufactures instructions require more precise workmanship.
5. Ensure that work is performed by persons specializing in the specific trade and class of work required, and qualified to produce workmanship of specified quality.
6. Secure products in place with positive anchorage devices designed and sized to withstand seismic, static and dynamic loading, vibration, physical distortion or disfigurement.

K. If reference standards or manufacturers' instructions contain provisions that would alter or are at variance with relationships between the parties to the contract set forth in the contract Documents, the provisions in the contract Documents shall take precedence.

L. When required by individual Specification sections, Contractor shall provide the following services from a manufacturer's representative:
1. Review of Specifications and design and concurrence or suggestions for modification.
2. Site observation of conditions of use and substrate.
3. Observation of the installation work in progress and on completion.
4. Start up, testing, and adjustment of equipment.
5. Instruction to the City in operation and maintenance.
6. Provide written signed report by manufacturer's representative documenting services provided and any comments or recommendations.

M. The work will be inspected by City inspectors and/or independent inspection service personnel under coordination of the City. All work is subject to inspection and shall remain accessible and exposed until it has been inspected by the City. Any work covered up or made inaccessible before such inspection shall be uncovered and made accessible without additional expense to the City. The City can request inspection of delivered material to confirm meeting of standards and specifications. An installation under supervision of the City can be requested to check proper installation. Contractor is to grant access to all material and finished and unfinished work at any time upon request. At least 3 business days notice has to be given to the City prior to arrival of material and equipment to be inspected. This includes concrete, which will be sampled and tested by the City.

N. Inspection or testing performed by the City Engineer or his designee shall not relieve the Contractor from responsibility for performing his own quality control and for complying with the requirements of the contract Documents. The City will not be responsible for the Contractor's failure to carry out work in accordance with the contract Documents.

O. Cooperate and arrange meetings with City or designee (Cx). Fill out and submit all documents required by Cx. Commissioning checklists need to be filled out truthfully at the time indicated. This includes but is not limited to delivery checklist (at time of delivery), installation checklist (at time of installation) and start up checklist (at time of startup). Commissioning involves among other things:
1. Inspection of material arriving at site regarding right type, number and undamaged package and proper storage.
2. Inspection of installation
3. Test of proper function
4. Review of Training and submitted O&M material
5. Test of proper function before end of warranty period

1.16. CODES AND PERMITS

A. Applicable provisions of Public Law, the Constitution and Laws and Statutes of the State of Wisconsin and the codes and regulations of governmental departments are hereby referred to and made a part of this contract and all work performed shall be in accordance with such laws, regulations and the latest edition or supplement or amendment thereto in effect at the time of submittal of bid shall be considered to be the issue in effect (unless shown otherwise) of all applicable codes including, but not limited to:
1. Wisconsin Building Code
2. Wisconsin Electrical Code
3. Wisconsin Mechanical Code
4. Wisconsin Plumbing Code
5. Wisconsin Energy Code
6. Wisconsin Fire Code
7. NFPA 70 National Electrical Code

8. General Services Administration 41 CFR Part 101-19
9. Americans with Disabilities Act (ADA)
10. Energy Conservation Performance Standards,
11. Local Codes
12. Occupational Safety and Health Act (OSHA)
13. Occupational Safety and Health Standards, Department of Labor
14. Safety and Health Regulations for Construction, Department of Labor
15. Wisconsin Fire Code
16. National Electrical Safety Code, ANSI C2
17. Environmental Protection Agency regulations
18. Clean Air Act
19. Clean Water Act
20. Resource Conservation and Recovery Act
21. Toxic substances Control Act
22. Wisconsin Department of Health and Family Services
23. State and Regional Water Quality Control Boards
24. County and Municipal ordinances

B. In case of conflict or overlap of the above references, the most stringent provision shall apply.

C. If necessary, file and maintain Notification of Demolition and/or Renovation and Application for Permit Exemption (WDNR Form 4500-113) in accordance with the Wisconsin Administrative Code Chapter NR447.

D. Contractor is expected to know or to ascertain, in general and in detail, the requirements of all codes and ordinances, and all rulings and interpretations of code requirements being made by all authorities having jurisdiction over the work performed by them, applicable to the construction and operation of systems covered by this contract. Where codes or standard specifications other than those listed in this paragraph are referred to in the different Divisions of these specifications, it is understood that they apply as fully as if cited here. Where differences exist between codes affecting this work, the code affording the greatest protection to the City shall govern.

E. All cost for items and procedures necessary to satisfy requirements of all applicable codes, ordinances and authorities, whether or not these are specifically covered by drawings or specifications. All cases of serious conflict or omission between the drawings, specifications, and codes shall be brought to the City's attention as herein before specified. The Contractor shall carry out work and complete construction as required by applicable codes and ordinances and in such a manner as to obtain approval of all authorities whose approval is required.

F. Contractor is responsible for obtaining permits at its own cost including expenses for supporting documents. Deliver original permits to the City before work starts. Apply for, arrange and pay for all required installation inspections required. Deliver originals of these certificates to the City. Include copies of the certificates in the Operating and Maintenance Instructions. Contractor shall arrange all required inspections and correct all deficiencies at no cost to the City.

G. The Contractor must maintain all licenses required for the work performed and required by authorities. The Contractor must submit proof of holding the license or certificate upon request. If a Contractor loses a license for whatever reason he must inform the City immediately after learning about that himself.

H. <u>Permit to Penetrate Ground or Existing Surfaces of City Property:</u>
1. Prior to any penetration of the ground or existing concrete surfaces (including the use of stakes or poles) in excess of 1.5", the Subcontractor shall obtain from the Project Representative a Permit to penetrate or Excavate Existing Surface of city Property and shall adhere to the conditions of the permit during such work. The Permit and all conditions in it shall be considered part of these specifications and shall be included in the contractor's bid amount.
2. In areas where a Permit to penetrate or excavate existing surfaces of city property is not required, contractors shall verify by safe means, prior to drilling, that no utilities or services are enclosed within the area to be drilled.

I. <u>Fire Safety Permit:</u>
1. All operations with open flames or that cause sparks or is near gas lines or near combustible storage containers require a daily Fire Safety Permit issued by the Project Representative. Contractor shall not commence such work until the permit is issued. Activities requiring a Permit include, but are not limited to, electric arc and gas welding

and flame cutting, other open flame operations, tar kettles, powder activated tools and excavations. Fire watch personnel shall be provided the contractor in sufficient number to continuously monitor all locations where work is conducting requiring a fire permit. The fire watch personnel shall remain on the job at least thirty minutes after such operations are completed. Fire safety personnel may be installers or welders.

2. Noncombustible shields or covers shall be provided by the contractor on tables, floors, walls, around the workstation, and over equipment to protect building structures, equipment and personnel from sparks and fragments of hot metal. Contractor shall also take these precautions to protect against sparks and hot metallic oxides generated by grinding, drilling or sawing operations.

J. Air Emissions Permits and Notifications:

1. For all projects that involve demolition of a structure, the contractor shall complete the asbestos demolition forms and notify all related authorities at least 10 working days in advance of the activity, regardless of the presence of asbestos.
2. For all projects that involve removal of regulated asbestos containing materials, the contractor shall complete the required asbestos removal forms and notify the authorities at least 10 working days in advance of the activity.
3. For any operations required to obtain an Authority to Construct or Permit to Operate from the authorities, the contractor shall provide in advance to the Project Manager the information needed for the application. Authorities may take more than 40 working days to process the application and issue the Authority to Construct or Permit to Operate; the contractor shall include this time in his Schedule of Operations; OWNER will grant no extra cost under this contract for this wait period.

1.17. SUBMITTALS

A. Documents have to be submitted in electronic form (PDF) as described elsewhere in addition to hardcopies no later than 3 business days after start work letter is issued. The City or designee will review, and process shop drawings and other required submittals with reasonable promptness. No delay will be allowed in the progress of the job attributable to Contractor's failure to supply submittals in time.

B. The Contractor shall submit three (3) prints of all shop drawings, submittal data consisting of brochures, catalogs, material lists, wiring diagrams, Material Safety Data Sheets (MSDS), samples, erection drawings, and equipment layouts for review by the City Engineer or his designee. General catalog sheets showing a series of the same device is not acceptable unless the specific model is clearly marked. Each submittal shall be provided together with a transmittal letter or form. Each original transmittal shall be assigned a transmittal number. The number shall begin with the first initial of the name of the Contractor’s firm followed by a serial number. The re-submittals shall indicate the same number with numerical suffix in sequence. Each transmittal shall itemize the enclosures and indicate the distribution of the transmittal and the enclosures. The following information shall be included on all submitted documents: Agency/Location/Address obtained, project number, building name, project name. Submittals shall be grouped to include complete submittals of related systems, products, and accessories in a single submittal. Mark dimensions and values in units to match those specified. Include wiring diagrams of electrically powered equipment.

C. Submit all original documents providing information regarding sustainability requirements including but not limited to recycled content, VOC, certified wood, disposal certificates and transportation distance. Contractor is required to prove that material and methods used meet all requirements specified elsewhere.

D. The City or designee will return the marked and stamped drawings together with transmittal letter or form to Contractor. If re-submittal is required, the City Engineer or designee will so note and Contractor shall make another submission for review after correction resolving the review comments on the prior submittals. The above procedure shall be repeated until the City Engineer or designee favorably reviews the submittal. The submittals must be approved before material is ordered and fabrication is authorized.

E. The City Engineer's or designee’s favorable review of shop drawings and other submittals shall not relieve the Contractor of responsibility for deviations from drawings or specifications, unless the Contractor has in writing called the City Engineer's or designee’s attention to such deviations at the time of submission, and the City Engineer or designee has acknowledged in writing such deviations; nor shall it relieve the Contractor from responsibility for errors of any sort in such drawings. If deviations, discrepancies, or conflicts between shop drawing submittals and the drawings and specifications are discovered either prior to or after the shop drawing submittals are reviewed by the City Engineer or designee, the drawings and specifications shall control and shall be followed. The Contractor shall be responsible for and

shall check the correctness of all documents including those subcontractors prior to submitting them to the City for review.

F. The Contractor shall furnish prints of the favorably reviewed final shop drawings, erection drawings, equipment layouts and vendor data to subcontractors and suppliers for the proper coordination of their work. The Contractor shall keep one (1) complete set of the above documents at the job site for the use of the City.

G. After the completion of the project, and prior to final payment, submit:
   A. One (1) copy of the Waste Manifest Records to the The City, if required in accordance with "Safety and Environment" Requirements Article "HAZARDOUS SUBSTANCES".
   B. The original and one (1) copy of all guarantee/warranty documents.

1.18. DRAWINGS AND SPECIFICATIONS

A. Drawings indicate approximate locations of the various items. These items are shown approximately to scale and attempt to show how these items should be integrated with building construction. Locate all the various items on-the-job measurements in conformance with code and cooperation with other trades.

B. Before locating items, confer with the City as to desired location in the various areas. In no case items shall be located by scaling drawings. Contractor must relocate items and bear cost of redoing work or other trades' work necessitated by failure to comply with this requirement.

C. Demolition drawings, location, circuit numbers, number and type of fixtures, type of mounting and control devices may not be correct. Do not scale drawings! All sizes are approximations and have to be field-verified by contractor! Demolition drawings are schematic and existing conditions need to be field-verified. In case of a discrepancy within and between the drawings that would cause and awkward or improper installation the engineer has to be notified for clarification prior to installation. Any work in conflict with the drawings shall be corrected at contractor's expense and at no cost to the owner. Contractor shall determine if scheduled devices fit into space and shall advice if not BEFORE ordering fixtures or devices.

D. If electrical items are to be relocated within 10 feet of location shown on drawings and Contractor is informed before work is begun on this portion of the job, the relocation shall be at Contractor's expense.

E. Drawings are schematic in nature and are not intended to show exact locations of conduit but rather to indicate distribution, circuitry, and control.

F. Standard Specifications: Standard Specifications such as ANSI, AASHO, AWWA, AISC, Commercial Standards, Federal Specifications, NEMA, UL, and the like incorporated in the requirements by reference shall be those of the latest edition at time of receiving bids, unless otherwise specified. The manufacturers, producers and their agents of required materials shall have such specifications available for reference and are fully familiar with their requirements as pertains to their product or material.

G. Contract Drawings and Specifications on the Job: contract drawings shall be kept on the job by the Contractor shall include at least one copy of Drawings and Specifications, all approved shop and erection drawings and schedules, lists of materials and equipment, as-built drawings, addenda and bulletins, documents relevant to the work.

H. Maintain a complete, precise, accurate dimensioned record of actual locations of the work, including concealed and embedded work, size and type of equipment, and every change or deviation from original contract drawings at the site. Keep this record legible and correct weekly as the job progresses on black or blue-line prints. Keep Record Drawings available for inspection at all times. Drawings will be inspected before approval of requests for payment.

I. It shall be the responsibility of the Contractor to submit to the City within ten (10) days after final inspection, one complete marked-up set of contract drawings fully illustrating all revisions made by all the crafts in the course of the work. This shall include all field changes, adjustments, variances, substitutions and deletions, whether covered by Change Order or not. Underground utility installations must be located precisely as constructed on the marked-up drawings.

J. The Contractor shall not take advantage of any apparent error or omission in the plans or specifications, and the City shall be permitted to make such corrections and interpretations as may be deemed necessary for the fulfillment of the intent of the plans and specifications.

K. In addition to verifying at the site all measurements shown on the Drawings, Contractor shall consult the Drawings and Specifications of related work or existing construction that may in any manner affect the work of this contract. Contractor shall promptly report to the City, in writing, any errors, omissions, violations, or inconsistencies that may be discovered as a result of such verifications; otherwise, it shall be understood that Contractor accepts all such related data and conditions without reservations.

L. Layout of existing piping, conduits, and locations of equipment are shown as exactly as could be determined during design of the facilities; but their accuracy, particularly when such layouts and drawings are schematic, cannot be guaranteed. Contractor shall check all Specifications including the Drawings for possible interference with electrical, mechanical, and structural details, as well as interference with existing building or equipment, and shall notify the City of the interference for resolution of the interference before commencing work. Any completed work that interferes shall be corrected by Contractor at Contractor expense so that the original design can be followed.

1.19. OPERATION AND MAINTENANCE DATA

A. Submit data bound in 8-1/2 x 11 inch (A4) text pages, Use three D side rings if necessary and binders with durable plastic covers. Submit all documents in electronic form as well as in hardcopy. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project and subject matter of binder when multiple binders are required.

B. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

C. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, typed on 20-pound white paper, in three parts as follows:

D. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, subcontractors, and major equipment suppliers.

E. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
   1. Summary list of maintenance items indicating frequency and type of maintenance required for all systems covered in this contract.
   2. Significant design criteria.
   3. List of equipment (including assigned equipment numbers).
   4. A description of recommended replacement parts and materials, which the City should stock.
   5. Parts list for each component.
   6. A summary of equipment vendors, or location where replacement parts can be purchased.
   7. List indicating types and grades of oil and/or grease, packing materials, normal and abnormal tolerances for devices, and method of equipment adjustment.
   8. Copies of all approved submittals.
   9. Operating instructions.
   10. Maintenance instructions for equipment and systems, Preventive maintenance recommendations.
   11. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   12. Manufacturer's wiring diagrams for electrically powered equipment.
   13. A complete set of record control drawings.
       a. Full as-built set of control drawings.
       b. Full as-built sequence of operations for each piece of equipment.
       c. Full points list. In addition to the updated points list required in the original submittals, a listing of all rooms shall be provided with the following information for each room:
          i. Floor
          ii. Room number
          iii. Room name

iv. Air handler unit ID
v. Reference drawing number
vi. Air terminal unit tag ID
vii. Heating and/or cooling valve tag ID
viii. Minimum cfm
ix. Maximum cfm

d. Full print out of all schedules and set points after testing and acceptance of the system.
e. Full as-built print out of software program.
f. Electronic copy on CD of the entire program for this facility.
g. Marking of all system sensors and thermostats on the as-built floor plan and mechanical drawings with their control system designations.
h. Maintenance instructions, including sensor calibration requirements and methods by sensor type, etc.
i. Control equipment component submittals, parts lists, etc.
j. Warranty requirements.
k. Copies of all checkout tests and calibrations performed by the Contractor (not commissioning tests).
l. The manual shall be organized and subdivided with permanently labeled tabs for each of the following data in the given order:
m. Sequences of operation
n. Control drawings
o. Points lists
p. Controller / module data
q. Thermostats and timers
r. Sensors and DP switches
s. Valves and valve actuators
t. Dampers and damper actuators
u. Program setups (software program printouts)

14. Additional information as indicated in the technical specification sections

F. Part 3: Project documents and certificates, including the following:
1. Product data.
2. Air and water balance reports.
3. Certificates.
4. Photocopies of warranties.
5. Name, address, and telephone number of the person or office to contact for service during the warranty period.
6. Name, address, and telephone number of the person or service organization to be contacted for service after the warranty period.

G. Submit all O&M manuals in original electronic form (PDF). Scanned copies are not acceptable. PDf need to be of high quality and searchable.

H. Submit 1 draft copy of completed volumes 15 [fifteen] days after approval of applicable submittal or receipt of the product. Revise content of all document sets as required prior to final submission. Submit 2 [two] sets of revised final volumes, within 10 [ten] days after final inspection.

1.20. SAFEGUARDS - EXISTING EQUIPMENT, UNDERGROUND UTILITIES AND ARTIFACTS

A. Existing utilities, including those listed as abandoned, shall not be moved or otherwise disturbed without written verification by the City that the utility is abandoned.

B. When altering existing facilities, the Contractor shall take every precaution to preserve and protect existing facilities, both those to be altered and those to remain unaltered that are within the limits of the work.

C. The Contractor shall notify the City of structural members, piping, conduit, or equipment not indicated for removal that may cause interference with the work. Work shall not proceed in the affected area until instructions have been issued. Do not drill or penetrate existing structures without prior permission. The removal of existing work shall be by methods that will not jeopardize the integrity of structures or systems that are to remain.

D. Existing utilities, including but not limited to roof drainage systems, underground cables, ducts, roadways, manholes, building fire alarm, public address or telecommunications wiring shall not be moved or otherwise disturbed, nor electrical circuits or switches operated or taken in or out of service, without prior consent of the City. Contractor shall compensate loss to the City resulting from damage to utilities.

E. If bones or artifacts are encountered during digging, the City requires that the Contractor stop work within a 50-foot radius of the find and immediately notify the City. Work may continue only with approval from the City.

1.21. ACCESS PANELS AND DOORS

A. All serviceable and replaceable devices, including but not limited to valves, boxes, and dampers shall receive an access at a location and in a size that enables proper servicing and repair of the device without removal of other material. The sizes described below are minimum sizes and might be increased if the type and size of device requires it. Install all piping, conduit, ductwork, and accessories to permit access to equipment for maintenance. Coordinate the exact location of wall and ceiling access panels and doors with the City or designee making sure that access is available for all equipment and specialties. Relocate access panel or door if equipment is not properly accessible to perform all maintenance and repair at no cost to the City.

B. LAY-IN CEILINGS:
   1. Removable lay-in ceiling tiles in 2 X 2 foot or 2 X 4 foot configuration are sufficient; no additional access provisions are required unless specifically indicated.

C. CONCEALED SPLINE CEILINGS:
   1. Removable sections of ceiling tile held in position with metal slats or tabs compatible with the ceiling system used.

D. METAL PAN CEILINGS:
   1. Removable sections of ceiling tile held in position by a pressure fit will be provided under Section 09500.

E. PLASTER WALLS AND CEILINGS:
   1. 16 gauge frame with not less than a 20 gauge hinged door panel, prime coated steel for general applications, stainless steel for use in toilets, showers, and similar wet areas, concealed hinges, screwdriver operated cam latch for general applications, key lock for use in public or secured areas, UL listed for use in fire rated partitions if required by the application. Use the largest size access opening possible, consistent with the space and the item needing service; minimum size is 12" by 12". Use “Cendrex” products or approved equal.

1.22. LOOSE AND DETACHABLE PARTS

A. Contractor shall retain all loose and small detachable parts of apparatus and equipment furnished under this Contract, until completion of the work and shall turn them over to the City to receive them.

B. Furnish one can of touch-up paint for each different color factory finish furnished by the Contractor. Deliver touch-up paint with other "loose and detachable parts".

1.23. STAIRS, SCAFFOLDS, HOISTS, ELEVATORS OR CRANES

A. The Contractor shall furnish and maintain equipment such as temporary stairs, fixed ladders, ramps, chutes, runways and the like as required for proper execution of work by all trades, and shall remove them on completion of the work. The Contractor shall erect permanent stair framing as soon as possible. Provide stairs with temporary treads, handrails, and shaft protection. Contractors requiring scaffolds shall make arrangements with the Contractor, or shall provide their own and remove them on completion of the work. The Contractor shall underlay its interior scaffolds with planking to prevent uprights from resting directly on the floor construction.

B. Contractor shall provide and pay for its own hoist/crane or other apparatus necessary for unloading/setting or moving their equipment and materials. Installation and removal of equipment for this activity must be accounted for in the Project Schedule. Equipment and operations for this activity shall comply with applicable Department of Commerce and OSHA requirements. No material hoist may be used to transport personnel unless it meets Department of Commerce and OSHA requirements for that purpose.

C. Existing elevators may be used on a limited basis with the City’s permission and agreement. The Contractor will pay costs of warranty extensions and additional service work required. Appropriate protection must be provided by the us-

ing Contractor and that Contractor shall be responsible for any structural, mechanical or finish damage to the elevator and its parts and to adjoining building finishes and components.

1.24 INSPECTIONS AND COMMISSIONING

It is of primary concern that all systems and assemblies in the project perform in accordance with the design intent and the Owner's operational needs. The owner will employ inspectors, Commissioning authority (CxA) and others to ensure installation and functionality are per contract plans and specifications.

The inspection and commissioning process is summarized below and will be adjusted by the CxA as required:

1. Submittal Review by CxA
    a. Including installation manuals, shop drawings, certifications etc.
    b. Revision of design if conflicts arise
    c. No equipment or material shall be installed before above is completed
    d. At any time CxA may require more documentation or information
2. Inspection:
    a. Performed by maintenance, PM, CxA or designee
    b. Checklist will be used as guidance for specific project
    c. Conflicts, installations errors etc. will be resolved by CxA
    d. Contractor needs to inform CxA when material is delivered, stored and installed to allow inspection
3. Witnessing of preparation work, startups and tests:
    a. Reasonable notice in advance must be given
    b. Startup plan must be provided and approved by CxA
    c. Contractor needs to inform CxA of all tests (i.e. flushing, pressure tests)
    d. Installations, procedures and tests that were not done with CxA included will have to be repeated at contractor's expense
4. Balancing TAB contractor shall provide TAB plan and approach for each component and system consisting of:
    a. Detailed step-by-step procedures for TAB work for each system and issue: terminal flow calibration (for each terminal type), diffuser proportioning, branch/sub-main proportioning, total flow calculations, rechecking, diversity issues, expected problems and solutions, etc. Criteria for using airflow straighteners or relocating flow stations and sensors will be discussed. Provide the analogous explanations for the waterside.
    b. List of all airflow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
    c. Details of how *total* flow will be determined (Air: sum of terminal flows via BAS calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations. Water: pump curves, circuit setter, flow station, ultrasonic, etc.).
    d. The identification and types of measurement instruments to be used and their most recent calibration date.
    e. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and provide methods to verify this.
5. The TAB field technicians shall keep a running log of events and issues. Submit hand-written reports of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests to the CA and CM at least twice a week. Communicate in writing to the controls Contractor all set point and parameter changes made or problems and discrepancies identified during TAB which affect the control system setup and operation.
6. Functional Tests:
    a. Startup equipment or system per manufacturer recommendation and maintain startup documentation
    b. Verify installation and operation per plans and specifications (inc. calibration for i.e. flow stations)
    c. Testing after the contractor tested equipment and verifies full functionality
        i. Contractor shall notify CxA of any problems that occurred regardless of if they were resolved or not
    d. Test shortly after installation of specific equipment
    e. Additional test procedures will be provided by CxA and performed by contractor.
    f. All tools needed shall be provided by contractor.
        i. Calibration certificates meeting the manufacturer's requirements need to be provided prior any testing.
        ii. Testing equipment needs to be of sufficient precision and accuracy in the expected value ranges
    g. Testing of complete system shall be at normal capacity
    h. Repeated seasonally deferred testing
    i. Include Tests in schedule
    j. Delays and re-testing caused by deficient installations won't relieve the contractor from his obligation to meet the contract deadline.

7. As-built plans shall be maintained by all trades
    a. On-site plans shall be used for daily markups where installation deviates from plan
    b. As-built plans shall be give to CxA and/or designer for implementation in as-built plans
8. Design-changes:
    a. Errors and omissions in design will be resolved with assistance of CxA
9. Problem resolution:
    a. CxA will set up meetings to resolve issues with the appropriate parties.
10. Information flow:
    a. CxA shall be informed of all changes to equipment, systems, control etc.
    b. CxA will maintain an issues-log and provide this to the contractor for resolution

HVAC and mechanical system and all integral equipment controls and all HVAC systems shall be commissioned, including, but not limited to:

- Chilled water system (chiller, cooling tower, filtration system, chemical treatment, piping, pumps)
- Heating water system (boilers, piping, pumps)
- Air handlers, Hydronic piping (including air separators and expansion tanks)
- Ductwork
- Thermal comfort, temperature and humidity control
- Variable speed drives, Air terminal boxes, Fan coil units, and Restroom exhaust system
- Facilities Monitoring and Control System
- TAB work
- HVAC and envelope differential pressure relationships,
- Fire protection system

Electrical Systems shall be commissioned, including, but not limited to:

- Scheduled lighting controls
- Lighting occupancy sensors
- Emergency power generator system and ATS
- Fire alarm

Static Water and Wastewater Efficiency Features shall be commissioned, including, but not limited to:

- Low flow faucet and shower aerators.

Static Energy Features shall be commissioned, including, but not limited to:

- Exterior windows and doors.
- Envelope and pipe insulation.
- ALL insulation work on pipes, ducts and envelope (including, but not limited to windows, doors, wall partitions) are subject to an IR scan and must meet industry standards such as ASTM and manufacturers and general recommendations and DoE, EPA and NREL recommendations.

Static Indoor Environmental Quality (IEQ) Features shall be commissioned, including, but not limited to:

- IAQ management during construction and turnover.
- Envelope air and moisture control design and integrity.
- Commissioning will be directed by a Commissioning Authority under the direction of the OWNER.

PART 2 – PRODUCTS

2.1. SPECIFIED ITEMS - SUBSTITUTES

A. Wherever catalog numbers and specific or trade names are used in conjunction with a designated material, product, thing, or service mentioned in these Specifications, they are used to establish the standards of quality, utility, and appearance required. Substitutions, which are equal in quality, utility, and appearance to those specified, will be approved, subject to the following provisions:

B. All Substitutions must be accepted by the City Engineer or designee in writing. The City Engineer or designee will accept, in writing, such proposed substitutions as are in his or her opinion, equal in quality, utility, and appearance to the items or materials specified. Such acceptance shall not relieve the Contractor from complying with the requirements of the drawings and specifications, and the Contractor shall be responsible at Contractor's own expense for any changes

resulting from Contractor proposed substitutions which affect the other parts of Contractor's own work or the work of others.

C. The manufacturer shall be a company specializing in the manufacture of the specified equipment and accessories with minimum five years documented experience.

D. Failure of the Contractor to submit proposed substitutions for approval in the manner described above and within the time prescribed shall be sufficient cause for disapproval by the City Engineer or designee of any substitutions otherwise proposed.

2.2. APPROVED TESTING LABORATORIES

A. The following laboratories are approved for providing electrical product safety testing and listing services as required in these specifications:
   1. Underwriters Laboratories Inc.
   2. Electrical Testing Laboratories, Inc.

2.3. HAZARDOUS SUBSTANCES

A. The Subcontractor shall submit to the Project Representative, for review by the EH&S Division, any proposed procurement, stocking, installing, or other use of materials containing asbestos, cadmium, chromates, or lead.

B. All materials and applications shall comply with requirements of any and all Districts Regulations, including, but not limited to architectural coatings, general solvent and surface coatings, solvent cleaning operations, adhesive and sealants, visible emissions, and asbestos.

C. Contractor shall keep and maintain proof of compliance with the above-referenced regulations, including any record-keeping obligations, for a period of two years after completion of the project. Contractor shall make such documents or evidence available if so requested by CITY.

D. No materials outlawed in any of the 50 US states are to be used. Only equipment and material legal in all 50 states is to be used. All Federal, state, county and local codes and ordinances regarding are to be considered deciding if a piece of equipment or material is to be used.

E. The contractor assumes responsibility for proper removal, collection and storage of hazardous substances on site and disposal of those if hazardous substances were known to be present and pointed out in these specifications or on the plans. If hazardous substances are not known to be present and are found, the city assumes responsibility for additional cost due to removal, collection and storage on site. All hazardous substances are to be disposed in accordance with all federal, state and local laws, codes and regulations. It is the contractor's responsibility to recognize typical hazardous substances not known to be present. This includes all substances that were used in buildings of that type in the period since original construction.

F. Contractor will assume that all electronic components, machinery, refrigeration devices and other common devices contain hazardous substances and include disposal of such in bid price, even if those substances are not mentioned separately. If special tests are necessary the city assumes responsibility for such.

G. ASBESTOS
   1. Contractor's attention is directed to WAC NR 447, WAC HSS 159 and the Occupational Safety and Health Act (OSHA) in general, part 1926.1101--ASBESTOS in particular. Contractor is responsible for compliance with all applicable regulations when the work includes fastening to or coring through Asbestos Containing Materials (ACM) and disturbance of asbestos containing caulking and mastics. Unless otherwise indicated, all caulking, sealants, glazing compounds, gaskets, asphalt roofing materials and miscellaneous adhesives are assumed to contain asbestos and are considered to be Category I non-friable ACM as defined in NR 447. Waste material containing Category I non-friable ACM, is regulated as Construction and Demolition (C&D) waste and may be disposed of at a Department of Natural Resources (DNR) approved C&D waste landfill. If Contractor's work methods cause non-friable ACM to become friable, the Contractor is responsible for the disposal of the friable asbestos waste at a landfill specifically approved by DNR to accept friable asbestos. A copy of the signed waste manifest for the disposal of all friable asbestos waste shall be provided to CITY prior to request for final payment.

2. The regulations referenced above require removal of friable ACM and Category II non-friable ACM prior to demolition of a building. Category I non-friable ACM does not need to be removed from a building prior to demolition if the waste generated from the demolition is taken to a DNR approved C & D waste landfill. If the contractor chooses to recycle building materials from a building to be demolished, the contractor is responsible for removal and disposal of all Category I non-friable ACM in accordance with applicable regulations prior to demolition. If the contractor's demolition methods will cause non-friable ACM to become friable, the contractor is responsible for removal and disposal of all Category I non-friable ACM in accordance with applicable regulations prior to demolition.
3. The asbestos abatement contractor will require sole occupancy of the workspace during asbestos abatement work. Contractor shall communicate with the asbestos abatement contractor and make adequate allowance for the asbestos abatement work in the work schedule

H. Lead Based Paint

1. Conform with OSHA and EPA recommended worker safety requirements when removing lead based paint or material bearing lead based paint or material contaminated with lead by the demolition process. Contractor's attention is directed to the Occupational Safety and Health Act (OSHA) in general and particularly to 29 CFR 1910 (LEAD STANDARD) and to CFR 1926 (LEAD EXPOSURE IN THE CONSTRUCTION INDUSTRY). For OSHA compliance and regulation interpretations, contractors may contact the area OSHA office for this project. [Milwaukee, telephone (414) 297-3315; Appleton, telephone (414) 734-4521; Eau Claire, telephone (715) 832-9019]. Dispose of refuse containing lead based paint or contaminated with lead by the demolition process in conformance with State of Wisconsin Hazardous Waste Regulations set forth by the Department of Natural Resources and in conformance with OSHA and EPA recommended worker safety requirements.

I. PCB'S

1. Contractor's attention is directed to Wisconsin Administrative Code, Chapter NR 157 relative to PCB's. Refer to Division 26, Electrical within these specifications for work involving PCB's. Used lighting ballasts are accumulated separately as either PCB-containing or non-PCB containing and disposed of by the contractor.

J. Mercury-Containing Devices

1. Mercury containing devices are accumulated in our facilities for eventual recycling through a contracted vendor. These devices include certain building controls and switches, thermometers, and lamps. Lamps are stored in accordance with Environmental Protection Agency universal waste regulation 40 CFR part 273 including storing them in containers with labels describing the contents and the start date of accumulation.

K. Paint and related products

1. The oil-based paints are disposed of as hazardous waste

L. Used Appliances and Building Equipment

1. Used appliances include microwaves, refrigerators, and ice machines. Smaller pieces of building equipment include items such as water heaters and variable-drive motors. All of these items are recycled by a contracted vendor at eh contractor’s expense.

M. VOC

1. Volatile Organic Compounds in materials shall be limited to these maximum values:
    a. Adhesives and Sealants:
    b. Wood Glues: 30 g/L.
    c. Metal-to-Metal Adhesives: 30 g/L.
    d. Adhesives for Porous Materials (Except Wood): 50 g/L.
    e. Subfloor Adhesives: 50 g/L.
    f. Plastic Foam Adhesives: 50 g/L.
    g. Carpet Adhesives: 50 g/L.
    h. Carpet Pad Adhesives: 50 g/L.
    i. VCT and Asphalt Tile Adhesives: 50 g/L.
    j. Cove Base Adhesives: 50 g/L.
    k. Gypsum Board and Panel Adhesives: 50 g/L.
    l. Rubber Floor Adhesives: 60 g/L.
    m. Ceramic Tile Adhesives: 65 g/L.
    n. Multipurpose Construction Adhesives: 70 g/L.

o. Fiberglass Adhesives: 80 g/L.
p. Contact Adhesive: 80 g/L.
q. Structural Glazing Adhesives: 100 g/L.
r. Wood Flooring Adhesive: 100 g/L.
s. Structural Wood Member Adhesive: 140 g/L.
t. Single-Ply Roof Membrane Adhesive: 250 g/L.
u. Special Purpose Contact Adhesive (contact adhesive that is used to bond melamine covered board, metal, unsupported vinyl, rubber, or wood veneer 1/16 inch or less in thickness to any surface): 250 g/L.
v. Top and Trim Adhesive: 250 g/L.
w. Plastic Cement Welding Compounds: 250 g/L.
x. ABS Welding Compounds: 325 g/L.
y. CPVC Welding Compounds: 490 g/L.
z. PVC Welding Compounds: 510 g/L.
aa. Adhesive Primer for Plastic: 550 g/L.
bb. Sheet Applied Rubber Lining Adhesive: 850 g/L.
cc. Aerosol Adhesive, General Purpose Mist Spray: 65 percent by weight.
dd. Aerosol Adhesive, General Purpose Web Spray: 55 percent by weight.
ee. Special Purpose Aerosol Adhesive (All Types): 70 percent by weight.
ff. Other Adhesives: 250 g/L.
gg. Architectural Sealants: 250 g/L.
hh. Non-membrane Roof Sealants: 300 g/L.
ii. Single-Ply Roof Membrane Sealants: 450 g/L.
jj. Other Sealants: 420 g/L.
kk. Sealant Primers for Nonporous Substrates: 250 g/L.
ll. Sealant Primers for Porous Substrates: 775 g/L.
mm. Modified Bituminous Sealant Primers: 500 g/L.
nn. Other Sealant Primers: 750 g/L.
oo. Inside Paints and Coatings:
pp. Flat Paints, Coatings, and Primers: VOC not more than 50 g/L.
qq. Nonflat Paints and Coatings: VOC not more than 150 g/L.
rr. Dry-Fog Coatings: VOC not more than 400 g/L.
ss. Primers, Sealers, and Undercoaters: VOC not more than 200 g/L.
tt. Anticorrosive and Antirust Paints applied to Ferrous Metals: VOC not more than 250 g/L.
uu. Zinc-Rich Industrial Maintenance Primers: VOC not more than 340 g/L.
vv. Pretreatment Wash Primers: VOC not more than 420 g/L.
ww. Clear Wood Finishes, Varnishes: VOC not 1 more than 350 g/L.
xx. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
yy. Floor Coatings: VOC not more than 100 g/L.
zz. Shellacs, Clear: VOC not more than 730 g/L.
aaa. Shellacs, Pigmented: VOC not more than 550 g/L.
bbb. Stains: VOC not more than 250 g/L.

2.4. BARRICADES, SIGNS, WARNING DEVICES, AND TEMPORARY PLASTIC BARRIERS

A. Traffic barricades, traffic signs, and warning devices shall meet the requirements of applicable OSHA standards and the FHA Manual of Uniform Traffic Control Devices (MUTCD).

B. UV stabilized high-density polyethylene barrier fence free of holes tears and other defects. Provide 4’ tall fence in diamond or rectangular pattern. Fencing shall be “safety orange” color, unless otherwise noted.

C. Posts for temporary plastic barrier fencing shall be 5’ tall, minimum 12 gauge, painted metal posts.

PART 3 – EXECUTION

3.1. INSTALLATION

A. Install in accordance with manufacturer's instructions and all code requirements. Provide the City or designee with copy of manufacturer’s instructions prior to installation. Coordinate equipment location with piping, ductwork, conduit

and equipment of other trades to allow sufficient clearances. Locate equipment to provide access space for servicing all components. Install in accordance with recognized industry practices. The manufacturer's latest recommendations at the time of bidding shall be used.

B. Startup and test equipment and adjust operating and safety controls for proper operation.

C. Contractor shall coordinate work with existing equipment so that all systems, equipment and other components will fit the available space, and will allow proper service and repair. Each location needs to be approved by the City or designee. This also applies to existing equipment if newly installed equipment interferes with its accessibility. Location of equipment has to fit into existing panels, decoration or finish. The City can request minor position changes of equipment before the work has begun.

D. The Contractor shall cooperate in reducing objectionable noise or vibration. If noise or vibration is a result of improper material or installation, these conditions shall be corrected at no cost to the City. Abnormal buzzing in equipment is not acceptable.

E. Carpentry, Cutting, Patching, and Core Drilling:
   1. Provide carpentry, cutting, patching, and core drilling required for installation of material and equipment specified in the scope of work. Do not cut, core, or drill structural members without consent of the The City.

F. Waterproof Construction:
   1. Maintain waterproof integrity of penetrations of materials intended to be waterproof. Provide flashings at exterior roof penetrations. Caulk penetrations of foundation walls and floors watertight. Provide membrane clamps at penetrations of waterproof membranes. Provide waterproof NEMA 3R enclosures for all equipment or devices mounted outside or otherwise exposed to the weather.

G. Workmanship:
   1. Install using procedures defined in NECA Standard of Installation and shall be conform with all codes and regulations. Materials and equipment of the types for which there are National Board of Fire Underwriters' Laboratories (UL) listing and label service shall be so labeled and shall be used by Contractor.

H. Modifications to Existing Construction and Alterations:
   1. Alter, extend and reconnect existing conduit as necessary. Reconnect existing conduits, which were reused, cut or exposed because of construction as quickly as possible. Where wiring is involved, new wires shall be "pulled in" between the nearest available accessible reused outlets to the extent allowed by the governing code. Furnish and install new conduits for wires if they cannot be "pulled in" to existing conduits. All new conduits, wiring, and electrical items shall be connected to the existing systems so as to function as a complete unit. Where existing electrical equipment, devices, fixtures, electrically operated items, etc., interfere with any remodeling work, they shall be removed and reinstalled in another location to avoid such interferences. all existing and relocated equipment shall be left in good operating condition. Include in bid removal from service of existing electrical material and equipment as specified hereinafter, as noted on the drawings, or as needed by field conditions.

I. Painting of Equipment and Hardware:
   1. Provide moisture resistant paint for all exterior painting. Colors shall be as shown on the drawings unless specified. Refer to individual Sections and construction drawings for painting requirements. All exposed conduits, raceways and gutters inside and outside the building shall be painted to match the wall color.

J. Maintenance clearances shall be maintained around equipment as required by the Codes and Standards, and as recommended by the equipment manufacturers. The maintenance envelope and equipment access shall be kept clear of any obstruction. It is Contractor's responsibility to enforce these requirements with all the Contractors. The Contractor shall be responsible for correcting any infringement on this requirement at no cost to the City.

3.2. DELIVERY, STORAGE AND HANDLING OF MATERIALS

A. Contractor or the Contractor's authorized representative must be present to accept delivery of all equipment and material shipments. The City will not knowingly accept, unload or store anything delivered to the site for the Contractor's use. Inadvertent acceptance of delivered items by any or employee of the City shall not constitute acceptance or re-

sponsibility for any of the materials or equipment. It is the Contractor's responsibility to assume liability for equipment or material delivered to the job site.

B. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays. Materials and equipment shall be delivered to the site in adequate time to ensure uninterrupted progress of the work and inspection of material by the City. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Care shall be taken to prevent damage to materials and equipment during loading, transporting and unloading. Packaged materials and equipment shall be delivered to the site in original, undamaged containers bearing manufacturer's name, with seals unbroken. Packaged units shall be delivered in their original crates. Store in a clean and 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. Promptly inspect shipments to insure that the material is undamaged and complies with specifications. Materials or equipment, which do not conform to the Specifications or are damaged shall not be incorporated in the work and shall be immediately removed from the site.

C. Arrange for the necessary openings in the building to allow for admittance of all apparatus. When the building access was not previously arranged and must be provided by this Contractor, restore any opening to its original condition after the apparatus has been brought into the building.

D. Contractor shall confine equipment, apparatus, storage of materials and operations to limits indicated on the drawings or by specific direction of the City. The storage of materials on the grounds and within the building shall be in strict accordance with the instructions of the City. Storage of materials within the building shall at no time exceed the design carrying capacity of the structural system. The City assumes no responsibility for materials stored in building or on the site. The Contractor assumes full responsibility for damage due to the storage of materials. Repairing of areas used for placing of sheds, offices, and for storage of materials shall be done by the Contractor.

E. Material shall be stored according to manufacturer's recommendations as a minimum. Provide and maintain watertight storage sheds on the premises where directed, for storage of materials that might be damaged by weather. Sheds shall have wood floors raised at least 6" above the ground. Materials, construction sheds, and earth stockpiles shall be located so as not to interfere with the installation of the utilities nor cause damage to existing lines. Should it be necessary at any time to move material sheds or storage platforms, the Contractor shall move it at the Contractor's expense, when directed by the City. All materials affected by moisture shall be stored on platforms and protected from the weather. In addition, material must be stored in a location protected from vandalism and weather. If material is stored outside, it must be covered with opaque plastic or canvas with provision for ventilation to prevent condensation and for protection from weather. If necessary, material will be stored off site at the Contractor's expense. Offsite storage agreements will not relieve the Contractor from using proper storage techniques. Storage and protection methods must allow inspection to verify products.

F. All materials shall be stored in a manner that prevents release of hazardous material to the environment. All hazardous materials, including motor fuels, shall be properly handled and contained to prevent spills or other releases. The Contractor shall develop and maintain a contingency plan to provide emergency response, containment, and cleanup of spills of hazardous materials resulting from contract activities. All spills and releases shall be reported to the City as soon as possible. Please note that the Standard Specifications Section 107.4(f) must be followed and overrides any provision in these specifications.

G. Cover pipes and ducts to prevent corrosion or deterioration while allowing sufficient ventilation to avoid condensation. Do not store materials directly on grade. Protect pipe, duct, tube, and fitting ends so they are not damaged. Where end caps are provided or specified, take precautions so the caps remain in place. Protect fittings, flanges, and unions by storage inside or by durable, waterproof, above ground packaging.

H. Store windows and doors in upright position, off ground, under cover and protected from sunlight, weather and construction activities.

3.3. DEMOLITION

A. Perform all demolition as indicated on the drawings to accomplish new work. Demolition Drawings are based on casual field observation and/or existing record documents. Verify field measurements and circuiting arrangements as shown on Drawings, verify that abandoned wiring, piping, ducting and equipment serve only abandoned facilities. Report dis-

crepancies to the City before disturbing existing installation. Beginning of demolition means installer accepts existing conditions.

B. Demolition all abandoned services and devices in areas affected by this contract. This includes but is not limited to wiring, conduits, piping, and equipment.

C. Before demolition of any load bearing concrete a ground-penetrating radar or concrete X-ray scan needs to be performed to detect any rebar. This work shall be performed at least a week before demolition starts to give A/E the opportunity to resolve any issues by rebar or other obstacles in unexpected locations. Drawings with existing subsurface obstacles may not be correct and shall not be relied on.

D. Where demolition work is to be performed adjacent to existing work that remains in an occupied area, construct temporary dust partition to minimize the amount of contamination of the occupied space. Where pipe or duct is removed and not reconnected with new work, cap ends of existing services as if they were new work. Coordinate work with the City to minimize disruption to the existing building occupants.

E. All pipe, wiring and associated conduit, insulation, ductwork, and similar items demolished, abandoned, or deactivated are to be removed from the site by the Contractor. Maintain the condition of material and/or equipment that is indicated to be reused equal to that existing before work began. All piping and ductwork specialties are to be removed from the site by the Contractor unless they are dismantled and removed or stored by the City. Verify whether or not PCB ballasts exist in light fixtures, which will be disposed of. If PCB light fixture ballasts exist, then follow requirements in other sections related to electrical work.

F. Patch holes and openings caused by removal of material and equipment, or formerly covered by such, with like material and texture of surrounding surface. Painting is not necessary unless noted otherwise.

G. Disconnect all services in manner which allows for future connection to that service. Disconnect services to equipment at unions, flanges, valves, or fittings wherever possible.

H. Approval of all legal institutions shall be obtained prior to disposal of any equipment and materials. All disposal has to be in compliance with all local, county, state and nationwide regulations. All disconnected wiring shall be removed from all raceway systems, panels, enclosures pull boxes, junction boxes etc. irrespective of whether the removal is specified in the construction documents or not. The empty raceway systems shall be tagged spare on both ends of each termination.

I. Don’t demolition equipment and material that is to stay in place. Replace and repair any equipment and installations that get damaged during demolition. The Contractor shall restore all disturbed areas in accordance with the drawings and specifications. If plans and specifications do not address restoration of specific areas, these areas will be restored to pre-construction conditions as approved by the City Engineer.

J. Verify the locations of, and protect, any buildings, structures, utilities, paved surfaces, signs, streetlights, utilities, landscaping and all other such facilities that are intended to remain or be salvaged. Make such explorations and probes as necessary to ascertain any required protection measures that shall be used before proceeding with demolition.

K. Provide and maintain adequate catch platforms, warning lights, barricades, guards, weather protection, dust protection, fences, planking, bracing, shoring, piling, signs, and other items required for proper protection.

L. Report damage of any facilities or items scheduled for salvaging to the CITY Construction Representative.Repair or replace any damaged facilities that are not scheduled for demolition. Explosives shall not be used for demolition.

M. Provide protection for workmen, public, adjacent construction and occupants of existing building(s). Keep streets, walks and all other adjacent paved areas clean and swept clear of dirt, mud and debris deposited as a result of this operation. Protect surrounding area from dust. Control rodents, and other vermin associated with demolition operations.

N. Remove all equipment, fixtures and other materials scheduled for salvage prior to beginning demolition operations.

O. Abandon gas, electric and communication utilities in accordance with local utility company requirements, or applicable substantive requirements if considered private.

P. Carry out vehicle loading as necessary within the project boundaries or as defined or indicated on the drawings, but not in locations that block vehicular traffic on the streets or pedestrian traffic on adjacent public walks.

Q. Dismantle each structure in an orderly manner to provide complete stability of the structure at all times. Provide bracing and shoring where necessary to avoid premature collapse of structure.

R. Conduct demolition operations and the removal of rubbish and debris in such a way that a minimum of nuisance dust is caused. Constantly sprinkle rubbish and debris with water if necessary to keep nuisance dust to a minimum.

S. Where necessary to prevent collapse of any construction, install temporary shores, underpinning, struts or bracing. Do not commence demolition work until all temporary construction is complete.

T. During the execution of the work, provide, operate, and maintain all pumping equipment, suction and discharge lines in a number of capacity as required to keep all cellars and pits free of water from any source whatsoever at all times.

U. Masonry and concrete shall be demolished in small sections. Use braces and shores as necessary to support the structure of the building or structure and protect it from damage. Where limits of demolition are exposed in the finished work, cutting shall be made with saws, providing an absolutely straight line, plumb, true and square.

V. Operate equipment so as to cause a minimum of damage to plaster which is to remain, and so as to keep dust and dirt to a minimum.

W. BUILDING DEMOLITION:

1. Proceed with demolition in a systematic manner, from top of structure to ground. Complete demolition work above each floor or tier before disturbing supporting members on lower levels.
2. Neatly saw or cut joints at the limits of removal; whenever possible, locate cutes at existing joints.
3. Cut existing plaster with power saws equipped with plaster cutting blades and dust collection system.
4. Patch or repair any damaged surfaces or structural members at the limits of removal.
5. Remove structural framing members and lower to ground by hoists, derricks or other suitable means.
6. Remove all existing flooring in accordance with plans. Leave exposed existing sub flooring or surface in suitable condition for receiving new finished flooring.
7. Locate demolition equipment and remove structure so as to not impose excessive loads to supporting walls, floors or framing.
8. Break up and remove concrete slabs-on-grade, unless otherwise shown to remain.

X. DEMOLITION BELOW GRADE:

1. Demolish foundation walls and other below grade features in accordance with the plans. Unless otherwise noted, remove all below grade features to a point 4’ below adjoining existing grade, or proposed grade, whichever is lower. Basement and/or lowest level floors more than 4’ below existing grade need not be removed, but must be broken up to permit drainage.
2. Backfill and compact below grade areas and voids resulting from demolition of structures and other abandonment and demolition. Backfilling shall not begin until demolition and abandonment has been approved and documented by the CITY Construction Representative. Prior to placement of fill materials, ensure that areas to be filled are free of standing water, frost, frozen materials, trash and debris.

Y. DRAIN TILE:

1. Carefully protect and/or replace drain tiles encountered during demolition which are necessary to maintain site drainage conditions. Immediately repair or replace any drain tiles not scheduled for demolition, but damaged. Report damage to the CITY Construction Representative.
2. Repairs to drain tile or replacement drain tile shall be comparable or better than the existing drain tile system.
3. Test drain lines with water to assure free flow before covering. Remove all obstructions which may be found, retest until satisfactory.

3.4. OPENINGS, SLEEVES, CUTTING, PATCHING AND PAINTING

A. Before any drilling, cutting or other type of opening the contractor shall verify that no conduits, wires, pipes or other items are in or near opening area. X-ray or ground-penetrating radar technology shall be employed to survey ceilings, slabs or walls when potentially damaging opening techniques are employed. Existing available data and records may not be accurate regarding exact location of structural steel, pipes or conduit.

B. The Contractor requiring openings shall furnish and install all sleeves required for their penetrations. Openings that are required and are not shown on the structural and/or architectural drawings shall be the responsibility of the Contractor requiring the openings. The Contractor shall install sleeves for these openings or cut openings as needed (including floor openings within chases).

C. The Contractor shall be responsible for coordinating locations of their sleeves with work of other trades. The Contractor who requires sleeves and/or openings shall submit through the Contractor, to the City for review and approval, layout drawings of all such required sleeves and/or openings. Sleeve and opening layout drawings shall be received by the City a minimum of two weeks prior to installation of the sleeves and openings. Sleeve and opening sizes and locations shall be dimensioned from column lines and floor elevations or from a point of reference approved by the City.

D. Provide galvanized sheet metal sleeves for pipe and conduit penetrations through interior and exterior walls to provide a backing for sealant or firestopping. Patch wall around sleeve to match adjacent wall construction and finish. Grout area around sleeve in masonry construction. In finished spaces where pipe penetration through wall is exposed to view, sheet metal sleeve shall be installed flush with face of wall. Pipe sleeves in new poured concrete construction shall be schedule 40 steel pipe (sized to allow insulated pipe to run through sleeve), cast in place.

E. In all piping floor penetrations, fire rated and non-fire rated, top of sleeve shall extend 2 inches above the adjacent finished floor. In existing floor penetrations, core drill sleeve opening large enough to insert schedule 40 sleeve and grout area around sleeve with hydraulic setting, non-shrink grout. If the pipe penetrating the sleeve is supported by a pipe clamp resting on the sleeve, weld a collar or struts to the sleeve that will transfer weight to existing floor structure.

F. For floor penetrations through floors in mechanical, food service areas, parking ramps, sanitary pumping stations, swimming pool equipment rooms, chemical storage and hazardous waste storage rooms and other wet locations or locations that can get wet by accident or failure of a component, core drill opening and provide a sleeve fastened to floor surrounding the penetration or group of penetrations to prevent water from entering the penetration. Top of sleeve shall be 4 inches above the adjacent floor. Provide urethane caulk between angles and floor and fasten angles to floor a minimum of 8” on center. Seal corners water tight with urethane caulk. Or, core drill sleeve openings large enough to insert schedule 40 sleeve and grout area around sleeve with hydraulic setting non-shrink grout/cement. Size sleeve to allow insulated pipe to pass through sleeve and paint the sleeve.

G. Pipe sleeves for conduits 6" in diameter and smaller, in new poured concrete construction, shall be schedule 40 steel pipe, plastic removable sleeve or sheet metal sleeve, all cast in place.

H. Cutting and patching required to access work in existing walls, in chases, above inaccessible ceilings, below floors, etc., shall be done by the Contractor. The Contractor shall do all cutting, or fitting of the work as required to make its several parts fit together, or to receive the work of others, as shown or reasonably implied by the drawings or specifications, or as may be directed by the City. Holes cut in exterior walls and/or roofs shall be waterproofed.

I. The Contractor who cuts shall also be responsible for patching. Where cutting and patching is required, the Contractor shall hire individuals skilled in such work to do cutting and patching. The Contractor who removes or relocates building components which leaves a remaining opening shall be responsible for patching the opening.

J. Patching includes repairing openings to match adjacent construction and painting the surface to match existing surface including texture. Painting means covering the entire wall where patching is to be done to nearest break point or corner unless indicated to be done by other trades. All paining will require patching. This includes all painting included in other sections.

K. Contractor shall not endanger any work by cutting, digging or otherwise and shall not cut or alter the work of others without their consent. Do not pierce beams or columns without permission of the City and then only as directed in

writing. If any ductwork, piping, conduit, etc. is required through walls or floors where no sleeve has been provided, use a core drill or saw cut to prevent damage and structural weakening.

L. Wherever any material, finish, or equipment, is damaged, the skilled trade shall accomplish the repair or replacement, in that particular work and the cost shall be charged to the party responsible for the damage. The City reserves the right to disallow any means and/or methods that, in the opinion of the City, are harmful to and/or not in the best interest of preserving the improvements receiving the work.

M. The Contractor penetrating a wall/floor/ceiling is responsible for sealing this opening to the same fire rating as the wall/floor/ceiling is rated. All walls, floors and ceilings are considered to have a 1 hour rating at minimum unless a higher rating is determined. This also applies to walls, floor and ceilings that are not rated.

N. Sealing and firestopping of sleeves/openings between conduits, cable trays, wire ways, troughs, cablebus, busduct, pipes, ducts etc. and the structural or partition opening shall be the responsibility of the Contractor whose work penetrates the opening. The Contractor responsible shall hire individuals skilled in such work to do the sealing and firestopping. These individuals hired shall normally and routinely be employed in the sealing and fireproofing occupation. Apply sealant to both sides of the penetration in such a manner that the annular space between the pipe sleeve or cored opening and the pipe or insulation is completely blocked.

O. FIRE AND/OR SMOKE RATED PENETRATIONS:
   1. Install approved product in accordance with the manufacturer's instructions where an installation penetrates a fire/smoke rated surface. When pipe is insulated, use a product, which maintains the integrity of the insulation and vapor barrier.
   2. Where firestop mortar is used to infill large fire-rated floor openings that could be required to support weight, provide permanent structural forming. Firestop mortar alone is not adequate to support substantial weight.
   3. Whenever possible, avoid penetrations of fire and smoke rated partitions. When they cannot be avoided, verify that sufficient space is available for the penetration to be effectively fire and smoke stopped. All firestopping systems shall be by the same manufacturer. Firestop systems shall be UL listed or tested by an independent testing laboratory approved by the Department of Commerce. The Contractor will be responsible for selecting the appropriate UL tested fire stop system for each application required on the project and will submit this to the City or designee for review. Each firestop manufacturer has specific details for different applications they have tested.
   4. Manufacturers: 3M, STI/SpecSeal, Tremco, Hilti or approved equal.
   5. Submittals: Contractor shall submit product data for each firestop system. Submittals shall include product characteristics, performance and limitation criteria, test data, MSDS sheets, installation details and procedures for each method of installation applicable to this project. For non-standard conditions where no UL tested system exists, submit manufacturer's drawings for UL system with known performance for which an engineering judgment can be based upon. Use a product that has a rating not less than the rating of the wall or floor being penetrated. Reference architectural drawings for identification of fire and/or smoke rated walls and floors.
   6. Contractor shall use firestop putty, caulk sealant, intumescent wrapstrips, intumescent firestop collars, firestop mortar or a combination of these products to provide a UL listed system for each application required for this project. Provide mineral wool backing where specified in manufacturer's application detail.

P. NON-RATED PENETRATIONS:
   1. Conduit Penetrations Through Below Grade Walls: In exterior wall openings below grade, use a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the uninsulated conduit and the cored opening or a water-stop type wall sleeve.
   2. Conduit and Cable Tray Penetrations: At conduit and cable tray penetrations of non-rated interior partitions, floors and exterior walls above grade, use urethane caulk in annular space between conduit and sleeve, or the core-drilled opening.

Q. In exterior wall openings below grade, assemble rubber links of mechanical seal to the proper size for the pipe and tighten in place, in accordance with manufacturer's instructions.

3.5. CONCRETE WORK

A. Provide all layout drawings, anchor bolts, metal shapes, and/or templates required to be cast into concrete or used to form concrete for support or installation of electrical, mechanical, plumbing piping, fixtures, specialties and equipment. This includes but is not limited to piping thrust restraints, pipe supports, hydrant supports, manholes, catch basins,

grease traps, septic tanks, distribution boxes, valve pits, meter pits, cleanout cover pads, yard hydrant pads, etc. Coordinate locations of equipment, pipe penetrations in wet areas, etc. with other trades.

B. Unless noted otherwise provide cast in place concrete for equipment pads, manhole bases and thrust blocks. Concrete to be 3,000 psi at 28 days, 3/4 inch aggregate, five bags cement, three inch slump, air entraining admixture. The ACI 614 Recommended Practice for Measuring, Mixing and Placing of Concrete shall constitute the execution requirements.

3.6. EXCAVATION, BACKFILL, AND SURFACE RESTORATION

A. The Contractor shall take all measures necessary to become acquainted with the location of underground service, utilities, structures, etc., which may be encountered or be affected by the Contractor's work, and shall be responsible for damage caused by neglect to provide proper precautions or protection. As a minimum to become acquainted with such underground appurtenances, the Contractor shall: 1) Observe existing conditions visible at the site immediately prior to commencement of work; 2) Review available site plans incorporated in the contract documents and/or provided by the City; 3) Final check with the City for additions to or changes from conditions indicated on site plans for the facility.

B. Before excavation in areas with utilities nearby, a ground-penetrating radar or ground radar scan needs to be performed to detect any subsurface obstacles. This work shall be performed at least a week before demolition starts to give A/E the opportunity to resolve any issues by utilities or other obstacles in unexpected locations. Drawings with existing utilities may not be correct and shall not be relied on.

C. Verify the locations of any water, drainage, gas, sewer, electric, telephone or steam lines which may be encountered in the excavation. Underpin and support all lines. Cut off service connections encountered which are to be removed at the limits of the excavation and cap. Existing pipes, electrical work, and all other utilities encountered, which may interfere with new work, shall be re-routed, capped, cut off, or replaced by the Contractor.

D. Perform all excavation and backfill work necessary to accomplish indicated systems installation. Excavate to below bottom of pipe and structure bedding (4" in stable soils, 6" in rock or wet trenches and 8" in unstable soil). Finish bottoms of excavations to true, level surface. Install lines passing under foundations with minimum of 1-1/2 inch clearance to concrete and insure there is no disturbance of bearing soil. Excavate whatever materials are encountered as required to place at the elevations shown, all pipe, manholes, and other work. Remove debris and rubbish from excavations before placing bedding and backfill material.

E. Remove rock encountered in the excavation to a minimum dimension of six (6) inches outside the pipe. Rock excavation includes all hard, solid rock in ledges, bedded deposits and unstratified masses, all natural conglomerate deposits so firmly cemented as to present all the characteristics of solid rock; which material is so hard or so firmly cemented that in the opinion of the City Engineer it is not practical to excavate and remove same with a power shovel except after thorough and continuous drilling and blasting. Rock excavation includes rock boulders of 1/2 cubic yard or more in volume. Rock excavation will be computed on the basis of the depth of rock removed and a trench width two (2) feet larger than the outside diameter of the pipe where one (1) pipe is laid in the trench and three (3) feet larger than the combined outside diameter where two (2) pipes are laid in the trench. Include 6" pipe and structure bedding in rock excavation. Include rock excavation shown on the plans in the Base Bid.

F. Bed pipe up to a point 12" above the top of the pipe. Take care during bedding, compaction and backfill not to disturb or damage piping. Bedding up to a point 12" inches above the top of a pipe or conduit shall be thoroughly compacted sand or crushed stone chips meeting the following gradations:

Gradation for Bedding Sand		Gradation for Crushed Stone Chip Bedding	
Sieve Size	% Passing (by Wt)	Sieve Size	% Passing (by Wt)
1 inch	100	1/2 inch	100
No. 16	45 - 80	No. 4	75 - 100
No. 200	2 - 10	No. 100	10 - 25

Gradation for Bedding Sand		Gradation for Crushed Stone Chip Bedding	
Sieve Size	% Passing (by Wt)	Sieve Size	% Passing (by Wt)

1 inch	100	1/2 inch	100
No. 16	45 - 80	No. 4	75 - 100
No. 200	2 - 10	No. 100	10 - 25

G. Provide shoring, sheet piling and bracing in conformance with the Wisconsin Administrative Code to prevent earth from caving or washing into the excavation. Shore and underpin to properly support adjacent or adjoining structures. Abandon in place shoring, sheet piling and underpinning below the top of the pipe, or, if approved in advance by the City Engineer, maintained in place until other permanent support approved by the City Engineer is provided.

H. Tunnel or remove sidewalk and curb in areas of excavation to the nearest joint. Remove pavements, curbs and gutters to neat and straight lines to the limits of removal. Make sawcut lines parallel to existing joints, or parallel or perpendicular to pavement edges to form a neat patch. Carefully remove remaining pavement within the sawcut area. Leave existing base materials between the area disturbed by the work and the sawcut line undisturbed by the sawcutting, pavement removal, or pavement replacement processes.

I. Strip topsoil from area to be excavated, free from subsoil and debris, and store separately for later re-spreading. No topsoil shall be removed from site and all topsoil is property of the City. Remove surplus excavated non-topsoil materials from site and dispose properly.

J. At no time place excavated materials where they will impede surface drainage unless such drainage is being safely re-routed away from the excavation.

K. Provide and maintain all fencing, barricades, signs, warning lights, and/or other equipment necessary to keep all excavation pits and trenches and the entire subgrade area safe under all circumstances and at all times. No excavation shall be left unattended without adequate protection.

L. Elevations shown on the plans are subject to such revisions as may be necessary to fit field conditions. No adjustment in compensation will be made for adjustments up to two (2) feet above or below the grades indicated on the plans.

M. Three days before backfilling, the City shall be notified so that the City Surveyor can obtain the three-dimensional coordinates of all buried utilities. Buried utilities including the pipeline and any other utilities exposed during construction shall not be covered with backfill without the prior approval of the City. Coordination of this survey requirement is the responsibility of the Contractor. Surveyors will be provided by the when scheduled. The cost for delay or dig-up related to the Contractor's failure to schedule the utility survey shall be paid by the Contractor. Alternately, the Contractor shall install reference points consisting of nail and hub/flagging at all changes in grade or alignment of the new pipeline and for all other utilities exposed by the excavation. The Contractor shall keep a separate written record referenced to each point with the following information:
    1. Offset and depth to top and centerline of utility, accurate to 0.1 feet
    2. Type of utility (i.e. gas, water, etc.)
    3. Size of utility (i.e. 2", 4", 16" wide duct, etc.)
    4. Type of material of utility (i.e. cast iron, PVC, etc.)
    5. Identification tape shall be installed 12” above the buried utility crown. The identification tape shall be continuous for the entire length of utility. Before backfilling for buried utilities over identification tape, the City construction inspector will verify that identification tape has been installed.

N. Mechanically compact bedding and backfill to prevent settlement. The initial compacted lift to not exceed 24" compacted to 95% density per Modified Proctor Test (ASTM D-1557). Subsequent lifts under pavements, curbs, walks and structures are not to exceed 12" and be compacted to 95% density per Modified Proctor Test. In all other areas where construction above the excavation is not anticipated within 2 years, mechanically compact backfill in lifts not exceeding 24" to 90% density per Modified Proctor Test. Route the equipment over each lift of the material so that the compaction equipment contacts all areas of the surface of the lift.

O. Backfill above the bedding in lawn areas shall be thoroughly compacted excavated material free of large stones, organic, perishable, and frozen materials.

P. Backfill above the bedding under existing and future utilities, paving, sidewalks, curbs, roads and buildings shall be granular materials, pit run sand, gravel, or crushed stone, free from large stones, organic, perishable, and frozen materials.

Q. Completely restore the surface of all disturbed areas as described below to a like condition of the surface prior to the work. Level off all waste disposal areas and clean up all areas used for the storage of materials or the temporary deposit of excavated earth. Remove all surplus material, tools and equipment. Topsoil shall be spread upon order from the City, typically right before any planting to avoid disturbance of topsoil by construction activities.

R. Lawns: Topsoil with 4" of clean, friable, fertile topsoil conforming to D.O.T. Section 625, free from debris, lumps, rocks, roots, plants and seeds. Grade surfaces to match adjacent elevations. Rake smooth, free of lumps and debris. Sod with good quality nursery sod conforming to D.O.T. Section 631, be uniform, dense, free from weeds and consist of approximately 60% Kentucky blue grass and the balance perennial rye, fescue and white clover. Place sod with joints staggered and abutting. Maintain lawn areas for one month after installation. Department will be responsible for necessary watering and mowing. Contractor needs to inform Department about watering needs. Do necessary weeding, repair, reseeding or resodding until uniform catch is obtained.

S. Curb and Gutter: Concrete curb and gutter conforming to the City requirements and D.O.T. Section 601, Type D or L.

T. Sidewalk and Walkways: Non-reinforced concrete conforming to D.O.T. Section 602, thickness to match existing, cross slope of one-fourth inch per foot, scored into squares approximately equal to width.

U. Bituminous Concrete Pavements: 4" thick crushed stone base course conforming to D.O.T. Section 304 (excluding 304.2.4) and two pass bituminous concrete pavement conforming to D.O.T. Section 407, first course 1-1/2" binder, second course 1-1/2" surface.

3.7. DEWATERING AND STORMWATER MANAGEMENT

A. Provide, operate and maintain all pumps and other equipment necessary to drain and keep all excavation pits, trenches and the entire subgrade area free from water under all circumstances. Obtain general permit from the Wisconsin Department of Natural Resources district office for discharge of construction dewatering effluent. Obtain well permit from the Wisconsin Department of Natural Resources district office for dewatering wells discharging more than 70 GPM. Comply with permit requirements.

B. Temporary pumps required for pumping water from building excavation or from building proper shall be provided by the Contractor, including temporary connections. Permanent sump pumps shall not be installed until building is substantially complete and when approved by the City. The Contractor shall remove temporary pumps and connections when approved by the City.

C. Control grading around structures, pitch ground to prevent water running into excavated areas.Pits, trenches within building lines and other excavations shall be maintained free of water.Provide trenching, pumping, other facilities required.

D. Notify Architect/Engineer if springs or running water are encountered in excavation; provide discharge by trenches, drains, pumping to point outside of excavation. Provide information to Architect/Engineer of points and areas that water will be discharged. At the Engineer's option, the Contractor shall drain the spring to the storm sewer system by the use of field tile.

E. Be responsible for control measures to prevent damage from flooding, erosion, and sedimentation to on-site and off-site areas.

3.8. CLEANING

A. The Contractor shall clean up and remove from the premises, on a daily basis accumulation of surplus materials, rubbish, debris and scrap and shall repair all damage to new and existing equipment resulting from its work. When job is complete, this Contractor shall remove all tools, excess material and equipment, etc., from the site.

B. All installed items shall be cleaned at time of installation, and all lens exteriors shall be cleaned just prior to final inspection. Equipment shall be thoroughly cleaned of all stains, paint, spots, dirt and dust. All temporary labels not used for instruction or operation shall be removed. Dust, dirt and other foreign matter shall be removed completely from all

internal surfaces of all mechanical and electrical units, cabinets, ducts, pipes, etc. Dirt, soil, fingerprints, stains and the like, shall be completely removed from all exposed finished surfaces.

C. Contractor shall wash all glass immediately prior to the occupancy of this project. Work shall include the removal of labels, paint splattering, glazing compound and sealant. Surfaces shall include mirrors and both sides of all glass in windows, borrowed lights, partitions, doors and sidelights. In addition to the above, the Contractor shall be responsible for the general "broom" cleaning of the premises and for expediting all of the cleaning, washing, waxing and polishing required within the technical sections of the specifications governing work under this Contract. The Contractor shall also perform "final" cleaning of all exposed surfaces to remove all foreign matter, spots, soil, construction dust, etc., so as to put the project in a complete and finished condition ready for acceptance and use intended.

D. If rubbish and debris is not removed, or if surfaces are not cleaned as specified above, the City reserves the right to have said work done by others and the related cost(s) will be deducted from monies due the Contractor.

3.9. CONTINUITY OF SERVICE, SHUTDOWN AND ACCESS

A. Contractor shall verify the locations of any water, drainage, gas, sewer, electric, drainage, gas, sewer, electric, telephone/communication, fuel, steam lines or other utilities and site features which may be encountered in any excavations or other sitework. All lines shall be properly underpinned and supported to avoid disruption of service.

B. Contractor shall provide and maintain continuous service (power, controls, alarms, communication, elevators, HVAC, roads etc.) during the entire construction period. No outages shall be permitted on existing systems except at the time and during the interval specified by the City. Any outage must be scheduled when the interruption causes the least interference with normal institutional schedules and business routines and might be scheduled during after-hours if regular business hours are not acceptable to the City. No extra costs will be paid to the Contractor for such outages, which must occur outside of regular weekly working hours. Cost to the utility is paid by Contractor. The Contractor shall provide temporary utility services and bypasses for any disruptions not completed within this period. The Contractor shall restore any circuit interrupted as a result of this work to proper operation as soon as possible.

C. If the building is occupied and continues operation during construction, retrofit or demolition, Contractor must maintain ventilation and air conditioning for as large parts of the building as technically feasible. Spreading of dirt, dust and other construction related material must be kept to a minimum. Occupied and work areas must be separated by seals. All work affecting air conditioning and ventilation must be coordinated with the daily work in the building and approved by the City Engineer. If air conditioning, heating and ventilation has to be taken out of service for longer periods of time in parts of the building and work would be affected negatively, the Contractor shall provide temporary sufficient air conditioning, heating and ventilation in coordination with the department. All such taking out of service has to be coordinated and approved by the City Engineer.

D. If the shutdown involves the interface with, or modification of, existing building energy system(s), the Contractor shall be required to show the reviewed submittal and shop drawings of the proposed modifications. Shutdown schedules shall have been reviewed and approved by the City at least 72 hours prior to date of shutdown. Postponement by the City of scheduled shutdowns shall not constitute a basis for additional charges to the City.

E. Prior to the shutdown of any building energy system(s) the Contractor shall provide the following:
   1. Proof of receipt of all materials required for the shutdown or a written commitment from the responsible suppliers that the required materials will be available at the time of the shutdown.
   2. A list of the qualified Contractor personnel assigned to perform the work.
   3. Analysis of any affect on the utility or building energy system(s) and the estimated duration of the shutdown.
   4. Work plan for the shutdown
   5. A twenty-four-hour emergency callback phone number to be used by the City in the event of any problems or concerns with the modifications made to the building system(s) after the Contractor has left the site.

F. Any service connections encountered which are to be removed shall be cut off at the limits of the excavation and capped in accordance with the requirements of applicable codes and any specifications governing such removals.

G. Unless otherwise shown or directed, maintain existing access and egress to the facility throughout construction. Maintain ANSI A117 and ADA compliant access for disabled persons, delivery access, emergency vehicle access, and emergency egress. Do not interrupt access and egress without prior written approval from the City Engineer.

H. Do not interrupt or change existing traffic, delivery, or parking without prior written approval from the City Engineer. When interruption is required, coordinate schedule with the Owner agency to minimize disruptions. When working in public right-of-way, obtain all necessary approvals and permits from applicable municipalities and WISDOT.

I. When Contractor's activities impede or obstruct traffic flow, Contractor shall provide traffic control devices, signs and flaggers in accordance with other Contract Documents and the current version of the US DOT Manual on Uniform Traffic Control Devices (MUTCD), or as shown on the Drawings.

3.10. PROJECT MEETINGS

A. Project meetings will be held at the time designated by the City. If the principal of the firm does not attend meetings, a responsible representative of the Contractor who can bind the Contractor to a decision at the meetings shall attend. The City or designee will write a report covering all items discussed and decisions reached and copy of such report distributed to all parties involved.

B. During construction, weekly project meetings may be held at the discretion of the City.

C. Pre-Construction Meeting:
   1. Owner, design representatives and all contractor and sub-contractor representatives attend.

D. Pre-Installation Meeting:
   1. Conduct meeting at project site before any construction activity requiring coordination with other trades, owner or occupants. Inform the project manager of all meetings, formal or informal, and include all required parties. Meeting may be limited to phone or email conversation if deemed sufficient by the project manager.

E. Progress Meetings:
   1. The minutes of these meetings will be prepared by the Contractor and one copy issued as expeditiously as possible to the each party. Involved in the project. the Contractor will submit, in writing, questions and/or answers (previously obtained verbally) to be confirmed at each meeting.
   2. Contractor and subcontractors anticipating to work within the following weeks shall attend.

3.11. TEMPORARY CONSTRUCTION

A. Temporary construction shall conform to all requirements and laws of state and local authorities, which pertain to operation, safety, and fire hazards. Contractor shall furnish and install all items necessary for conformance with such requirements, whether called for under separate sections of these Specifications or not. Contractor shall provide, maintain, and remove upon completion of his work:
   1. Temporary crossovers and bypass to utilities, electrical connections, traffic and footbridges, and walkways used to maintain services or communications, which cannot be interrupted or curtailed.
   2. Temporary rigging, scaffolding, shoring, hoisting equipment, and all other temporary work as required for this project.
   3. Temporary barricades around openings and excavations for this project.

B. Temporary lighting, if necessary during the period of construction, shall be supplied and maintained by the Contractor at Contractor expense so that construction work can be safely performed. The temporary lighting system shall be sufficient to enable all trades to safely complete their work and to enable the City to check all work as it is being done. Illumination shall be 5 foot-candles minimum in all areas and, in addition, shall meet or exceed the requirements of 29 CFR 1926.56 Illumination (OSHA regulations). In accordance with the latest issue of the National Electrical Code, all temporary electrical circuits for construction purposes shall be equipped with combination ground fault interrupter and circuit breakers meeting the requirements of UL for Class A, Group 1 devices. The ground fault interrupter portion shall be solid-state type, insulated and isolated from the breaker mechanism. A test button shall be provided for checking the device. The breaker mechanism shall provide overload and short circuit protection and shall be operated by a toggle switch with over center switching mechanism so that contact cannot be held closed.

C. TEMPORARY HEAT
   1. All heating required after enclosure of the building shall be classified as TEMPORARY HEAT and be provided by the Contractor. It shall be the responsibility of the Contractor to see that every precaution is used to prevent unnecessary escape of heat. The Contractor shall provide and pay for temporary heat. A minimum temperature of 45 de-

grees and a maximum temperature of 65 degrees for the building shall be maintained, except for a period of at least ten days prior to the placing of interior woodwork and throughout the placing of this and other finish, varnishing, painting, tiling etc., and until substantial completion to provide sufficient heat to insure a temperature in the spaces involved of not less than 70 degrees nor more than 80 degrees. Temperatures must be checked during nighttime and on weekends. Restitution shall be made by Contractor responsible for damage to building and contents caused by overheating, freezing, fumes, soot or residue given off by temporary heating or lack of thereof.

2. Permanent heating system may be used for temporary heating. Warranty period may not be affected by use of permanent heating. If permanent system is used, the Heating Trade shall install in their permanent location heating coils or connectors as approved by the City, with controls to maintain temperatures required. Temporary filters shall be used in the permanent system. Provide bases, shields, etc., around heating elements to prevent too rapid drying of adjacent concrete, masonry or plaster. Relocation of some of the permanent heating system equipment may be required during construction to prevent interference with new construction. Temporary units may be installed in such areas during the time permanent equipment is not operating due to relocation. The temporary heating system shall be removed after the permanent heating system has been installed and is operating. Surfaces and structure shall be patched as required. Temporary heating equipment shall be relocated by the Heating Trade as required during construction to prevent interference with new construction.
3. The use of temporary units whose product of combustion will damage fresh concrete, mortar or other building materials, will not be allowed. Use of coke or oil salamanders is prohibited. All portable temporary heating units shall be properly ventilated to prevent combustion gases from remaining in the heating area.
4. If electrical power is required for oil or gas portable heating units, it may be taken from the available temporary power source and paid for by the Contractor. Heating units and the area surrounding the units shall be kept in a clean and safe condition.

D. TEMPORARY ELECTRICAL SERVICE

1. The Contractor shall make all arrangements with the local utility company for metered electrical service, pay for the installation of all temporary service to utility point of termination shown on drawings, and upon completion of project, pay for removal of temporary service. The meter shall be taken out in the Contractor's name. The Contractor shall patch surfaces and structure after services have been removed. The Contractor shall pay for all electrical energy consumed for construction purposes for all trades including temporary offices, for operation of ventilating equipment, for heating of building, and for testing and operating of all equipment. The Contractor shall continue to pay for energy used until substantial completion even though equipment has been connected to the permanent wiring.
2. Contractor shall provide and maintain a minimum of 200 ampere electrical services in single phase or multiphase as required by equipment to be used. Provide at multiple services to ensure service to run at less than 75% of its capacity at all times and to enable short cable runs of less than 300 ft to equipment to be used.
3. The Contractor shall provide meter base and wiring to point of utility termination, provide main fused service switch, and fused or breaker distribution panel(s). The Contractor shall also provide, at no cost to others, all lamps, wiring, switches, sockets and similar equipment required for temporary system until substantial completion. Upon completion of the project, the Contractor shall remove the temporary system.
4. After Substantial Completion of the permanent electrical system and building wiring, permanent receptacles may be used during finishing work. Permanent wiring for lighting fixtures, switches and receptacles shall be installed only after all masonry and plastering has been completed, but this wiring shall not be used for motors larger than fractional HP or for welding equipment. Circuits for larger motors and welding equipment may be provided with special circuits to mains of electrical panels at the expense of those trades requiring them, provided that special permission is obtained from the City and the installation is made by skilled electricians.
5. All temporary wiring and electrical installations shall be in accordance with applicable codes. Any power outage occasioned by tying into the existing electrical system for temporary or permanent use shall be coordinated with the City. The City does not guarantee the quantities or quality of power or water available for Contractor's use, nor will it be responsible in any manner for interruptions in service or for the effects of interruptions. If needed, contractor needs to provide and operate a generator at contractor’s expense.

E. TEMPORARY WATER, SEWER AND PUMPS

1. The Contractor shall supply all water required for construction and other purposes until the permanent water supply system is accepted and in operation. As soon as possible Contractor shall install and pay for permanent water mains into new building, provide temporary gate valve and freezing protection, extend piping and provide a ¾” hose bib for use by all Contractors. Permanent lines maybe used.

2. Waste of water shall be avoided and valves, connections, pumps pipes and hoses shall be provided by Contractor kept in perfect condition. Water supply used by workmen shall be kept clean and sanitary at all times.
3. Sewer work shall be started and finished as soon as possible. Including backfill.

3.12. IDENTIFICATION

A. Identify all equipment by stenciling (not less than 1 inch high letters/numbers) with one coat of black enamel against a light background or white enamel against a dark background. Use a primer where necessary for proper paint adhesion. Where stenciling is not appropriate for equipment identification, engraved name plates may be used (White letters on a black background, 1/16 inch thick plastic laminate, beveled edges, screw mounting, Setonply Style 2060 by Seton Name Plate Company or Emedolite Style EIP by EMED Co., or equal by W. H. Brady)

B. Identify interior piping not less than once every 30 feet, not less than once in each room, adjacent to each access door or panel, and on both side of the partition where accessible piping passes through walls or floors. Place flow directional arrows at each pipe identification location. Label all pipes with name of loop and arrows for flow direction with permanent label. Label all gauges. Use one coat of black enamel against a light background or white enamel against a dark background.

C. Identify all exterior buried piping for entire length with underground warning tape except for sewer piping which is routed in straight lines between manholes or cleanouts. Place tape 6"-12" below finished grade along entire length of pipe. Extend tape to surface at building entrances, meters, hydrants and valves. Where existing underground warning tape is broken during excavation, replace with new tape identifying appropriate service and securely spliced to ends of existing tape.

D. Identify valves with brass tags bearing a system identification and a valve sequence number. Use round brass tags with 1/2 inch numbers, 1/4 inch system identification abbreviation, 1-1/4 inch minimum diameter, with brass jack chains, brass "S" hooks or one piece nylon ties around the valve stem, available from EMED Co., Seton Name Plate Company, or W. H. Brady. Valve tags are not required at a terminal device unless the valves are greater than ten feet from the device, located in another room or not visible from device. Provide a typewritten valve schedule and pipe identification schedule indicating the valve number and the equipment or areas supplied by each valve and the symbols used for pipe identification; locate schedules in mechanical room and in each Operating and Maintenance manual. Schedule in mechanical room to be framed under clear plastic.

E. Provide all buried utilities, conduit and pipes with detectable underground warning tape, 5.0 mil overall thickness, 6" width, .0035" thick aluminum foil core with polyethylene jacket bonded to both sides. Color code tape and print caution along with name of buried service in bold letters on face of tape. Manufacturers: Thor Enterprises Magnatec or equal by Carlton, MSI Marking Services, Seton.

F. All underground non-metallic sewers/mains and water services/mains shall be provided with tracer wire installations. Tracer wire installations shall conform with Section 182.0715(2r) of Wisconsin Statutes and prevailing Department of Commerce Chapter 84 requirements. Tracer wire shall be continuous solid copper or steel plastic coated with split bolt or compression-type connectors.

G. SNAP-AROUND PIPE MARKERS:
1. One-piece, preformed, vinyl construction, snap-around or strap-around pipe markers with applicable labeling and flow direction arrows, ¾" min. size for lettering. Provide nylon ties on each end of pipe markers. Equal to Seton Setmark.

3.13. LUBRICATION

A. Lubricate all bearings with lubricant as recommended by the manufacturer before the equipment is operated for any reason. Once the equipment has been run, maintain lubrication in accordance with the manufacturer's instructions until the work is accepted by the City. Maintain a log of all lubricants used and frequency of lubrication; include this information in the Operating and Maintenance Manuals at the completion of the project.

3.14. PUNCH LIST

A. Contractor’s supervisor at site shall acknowledge receipt of punch list.

B. Multiple punch lists can be submitted and neither punchlist may be considered final. Punchlist can be submitted throughout the entire warranty period.

C. If Contractor fails to perform required corrective work in less than 30 days upon receipt of punch list by Contractor, the City can perform corrections or hire a separate contractor and charge the Contractor the full cost.

D. Contractor shall advice the City or designee that the necessary work has been performed. If the City or designee verify if punch list items were not resolved and the work was not performed in less than 30 days upon receipt of punch list by Contractor, the Contractor shall be required to compensate the for additional site visits of project manager, design professional and other related staff at a rate of $ 100/hour plus mileage. The amount shall be paid to the City or designee prior to processing the final payment. Payment may be processed as deductive change order.

3.15. TESTS AND FINAL ACCEPTANCE

A. The complete installation consisting of the several parts and systems and all equipment installed according to the requirements of the Contract Documents, shall be ready in all respects for use by the City and shall be subjected to a test at full operating conditions and pressures for normal conditions of use.

B. Proper notice has to be given to enable the City or designee to attend all tests. Failure to give proper notice can result in repeated tests to be paid for by the Contractor. Tests are acceptable on properly working equipment only and have to be repeated as often as required by the City at no cost to the City. If tests have to be repeated by an City-hired Contractor due to equipment not installed or working properly, the Contractor shall reimburse the City for additional testing expenses.

C. Contractor shall make all necessary adjustments and replacements affecting the work, which is necessary to fulfill the City's requirements and to comply with the directions and recommendations of the manufacturer of the several pieces of equipment, and to comply with all codes and regulations, which may apply to the entire installation. Contractor shall also make all required adjustments to comply with all provisions of the drawings and specifications.

D. Prior to acceptance, all elements of operating equipment, including those of mechanical nature and those that slide, swing, turn, or are intended to move in any way and those of an electrical nature, shall be given an operating test to assure to the satisfaction of the City that such equipment operates as required. Contractor shall make all adjustments, replacements, and such other modifications as needed. If it is necessary to run equipment in order to complete the work, for periods that exceed the manufacturer's recommended maintenance interval, the Contractor will provide such required maintenance at no additional cost to the City.

E. Notice that the work is ready for final inspection and acceptance shall consist of a written notice issued to the City by the Contractor stating that the Contractor has carefully inspected all portions of the work, has reviewed in detail the drawings and specifications, and that to the best of the Contractor's knowledge all conditions of the contract documents have been fulfilled. Upon receipt of this notice, the City and the Contractor shall make a joint inspection of the work. After deficiencies, if any, have been corrected or accounted for, and after all work is satisfactorily complete, the City will accept the work; and Notice of Completion will be filed by the City. The contractor shall test equipment before claiming completion.

F. Prior to final acceptance, filing of the Notice of Completion or processing of final payment, the following shall be done and submitted reviewed and accepted by the City:

1. Certificates of compliance and guarantees required under various Sections
2. Operating and maintenance manuals
3. Instruction to City personnel, as required
4. Test reports (TAB, fire alarm, elevator etc.)
5. Certifications and registrations (boiler etc.)
6. All keys
7. Replacement material as required in specifications
8. All required operations tests
9. All documents required by commissioning, LEED certification and other project related documents
10. Satisfy all commissioning requirements
11. As –built documents
12. All punch list items resolved

13. All training provided (except deferred seasonal training)
14. All warranty issues brought to Contractor's attention so far resolved
15. Warranty documents signed by representative of manufacturer, guarantee documents, roofing agreement and other warranty related documents

G. No official closeout and final payment will be made before all requirements are met.

3.16. TRAINING AND DEMONSTRATION

A. The City's facility staff (and occupants and service Contractors as needed), shall receive orientation and training on features, systems and equipment in this facility requisite with the complexity and criticality of the system and the City's needs.

B. Additional training requirements may be found in specific equipment sections. The City may video-record all training sessions.

C. Only training on equipment that works as designed and with approved Operations and Maintenance manual is acceptable.

D. The Contractor shall be responsible for training coordination and scheduling and ultimately for ensuring that training is completed on all equipment per the Specifications. Unless otherwise required or approved, the training shall be given during regular business hours during a regular work week.

E. The City or designee will be responsible for coordinating and approving the content and adequacy of the training of the City personnel for commissioned equipment. The City or designee will develop an overall training plan after meeting with the City and appropriate facility staff to determine needs and areas of emphasis for this project. The City or designee will develop criteria for determining that the training was satisfactorily completed, including attending some of the training, etc. The City or designee recommends approval of the training to the City.

F. Training shall consist of, as needed and at the discretion of the City or designee, the installing technician, installing Contractor and the appropriate trade or manufacturer's representative on each major piece of equipment. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment as installed in this project is required. More than one party will be required to execute the training on primary equipment. The Contractor shall attend and present at sessions in addition to the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.

G. Follow the outline in the table of contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference. Training Shall Include the Following:
1. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.
2. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, and special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shutdown, seasonal changeover, as applicable, and any emergency procedures.
3. Discussion of relevant health and safety issues and concerns.
4. Discussion of warranties and guarantees.
5. Common troubleshooting and maintenance issues, problems and solutions.
6. Explanatory information included in the O&M manuals and the location of all related plans and manuals in the facility.
7. Discussion of any peculiarities of equipment installation or operation.
8. The format and training agenda in The HVAC Commissioning Process, ASHRAE Guideline 1 is recommended, as applicable.
9. Hands-on training shall include start-up, operation in all modes possible, including manual, shutdown and any emergency procedures and preventative maintenance for all pieces of equipment.
10. Training shall occur after functional testing and piping and equipment labeling are complete unless approved otherwise by Onwner.

H. <u>HVAC control systems:</u>
1. For the primary HVAC equipment, the controls Contractor shall provide a short discussion of the control of the equipment during the mechanical or electrical training conducted by others.

2. The standard operating manual for the system and any special training manuals shall be provided for and retained by each trainee. In addition, the system technical manual shall be demonstrated during training. Manuals shall include detailed description of the subject matter for each session. The manuals shall cover all control sequences and have a definitions section that fully describes all relevant words used in the manuals and in all software displays. Manuals will be approved by the City or designee.
3. The trainings will be tailored to the needs and skill-level of the trainees and be oriented to the specific system installed in this project.
4. The trainers shall be knowledgeable on the system and its use in buildings. For the on-site sessions, the most qualified trainer(s) shall be used. The City shall approve the instructor prior to scheduling the training.
5. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system shall be repaired or adjusted as necessary and the demonstration repeated.
6. There shall be three training sessions:
    a. Training I - Control System: The first training shall be 4 hours in length.
    b. Training II - Building Systems: The second session shall be held on-site for a period of 12 hours of actual hands-on training after the completion of system commissioning. The session shall include instruction on:
        i. A review of the as-built drawings and O&M manuals, a walk-through of the facility to identify control panels and device locations.
        ii. Specific hardware configuration of installed systems in this building and specific instruction for operating the installed system, including HVAC systems, lighting controls and any interface with security and communication systems.
        iii. Security levels, alarms, system start-up, shut-down, power outage and restart routines, changing set points and alarms and other typical changed parameters, overrides, freeze protection, manual operation of equipment, optional control strategies that can be considered, energy savings strategies and set points that if changed will adversely affect energy consumption, energy accounting, procedures for obtaining vendor assistance, etc.
        iv. All trending and monitoring features (values, change of state, totalization, etc.), including setting up, executing, downloading, viewing both tabular and graphically and printing trends. Trainees will actually set-up trends in the presence of the trainer.
        v. Every screen shall be completely discussed, allowing time for questions.
        vi. Use of keypad or plug-in laptop computer at the zone level.
        vii. Use of remote access to the system via phone lines or networks.
        viii. Setting up and changing an air terminal unit controller.
        ix. Graphics generation.
        x. Point database entry and modifications.
        xi. Understanding FMCS field panel operating programming (when applicable).
    c. Training III - Deferred On-Site: The third training will be conducted on-site 6 months after occupancy and consist of 8 hours of training in one session. The session will be structured to address specific topics that trainees need to discuss and to answer questions concerning operation of the systems.

I. Testing Adjusting and Balancing: The Contractor shall have the following special training responsibilities relative to the testing, adjusting and balancing (TAB) work:
1. The TAB technician shall meet with facility staff after completion of TAB and instruct them on the following:
    a. Go over the final TAB report, explaining the layout and meanings of each data type.
    b. Discuss any outstanding deficient items in control, ducting or design that may affect the proper delivery of air or water.
    c. Identify and discuss any terminal units, duct runs, diffusers, coils, fans and pumps that are close to or are not meeting their design capacity.
    d. Discuss any temporary settings and steps to finalize them for any City-furnished, City-installed equipment.
    e. Other salient information that may be useful for facility operations, relative to TAB.

3.17. ROADWAY

A. The Contractor may build a temporary roadway for delivery of materials at the Contractor's own expense and maintain it until completion of construction or until service drives are installed. Where possible, build temporary roadway within the confines of the new roadway and allow others to use it at no cost. Any gravel topping used for temporary roadway shall be at least 6" below finished elevation of permanent drives. If temporary roadway is not intended to be con-

verted to a permanent road, all road materials shall be removed upon termination of access need, and the confines of the temporary roadway shall be repaired to match adjacent area.

3.18. FENCE

A. The Contractor shall provide a neat appearing protective fence where indicated on the drawing, constructed of standard studded T-Posts of sufficient length for line posts and spaced not to exceed 8'-0" apart. Corner posts and gate posts are to be galvanized steel pipe of not less than 2 1/2" o.d. and shall be properly braced. A 4-foot high wooden snow fence shall be securely fastened to the supports. Plastic fencing is not acceptable. The snow fence shall project 4" above the fence posts. Provide gates, properly constructed and braced, complete with hinges, hasps, and padlocks in number and location required for proper control, delivery and distribution of material and equipment. Gateposts shall be adequately back tied and anchored to insure a rigid installation. All protective fencing shall be maintained in an upright, orderly fashion throughout the construction schedule. In areas where existing trees are to be protected, the area inside the protective fencing shall not be used for any purpose related to construction activities, such as material storage, vehicle parking, portable toilets, or other disruptive activities that would result in damage of any kind to the site inside the fence.

3.19. SIGNS

A. Contractor shall furnish and install signs, located as directed by the City. The signs shall be readily legible to the general public, subcontractors, material men, and truck drivers approaching the site and shall include the following information:
   1. Project.
   2. Subcontract No.
   3. Subcontractor Name.

B. Access to Buildings: Contractor shall keep access to existing buildings clear at all times.

C. The Contractor shall order, paint and erect the sign. The sign shall be placed on the property where directed and shall be maintained for the duration of the construction period.

D. No individual advertising signs, plaques or credits, temporary or permanent, will be permitted on the building or premises, except the name of the Contractor on Contractor's office or material shed.

3.20. FIRE PROTECTION AND PREVENTION

A. The contractor shall develop and maintain an effective fire protection and prevention program at the job site through all phases of demolition, alteration, repair, and construction work. Contractor shall ensure the accessibility and availability of fire protection and suppression equipment.

B. Smoking shall be prohibited at or in the vicinity of operations, which constitute a fire hazard. Such areas shall be conspicuously posted with "NO SMOKING OR OPEN FLAME" signs.

C. Smoking is not permitted in any City buildings. No burning of rubbish or debris will be allowed at the site. Combustible waste shall be removed immediately or stored in fire resistive containers until disposed of in an approved manner.

D. The Contractor shall provide and maintain in working order during the entire construction period, a minimum of three (3) fire extinguishers on each floor level, including basement of the building, and one (1) in temporary office. Extinguishers shall be nonfreezing type such as A-B-C rated dry chemical, of not less than 10-pound capacity each. In addition, any subcontractor who maintains an enclosed shed on the site shall provide and maintain, in an accessible location, one or more similar nonfreezing type fire extinguisher in each enclosed shed.

3.21. ACCIDENTS AND SPILLS

A. The contractor’s representative shall immediately notify the Project Representative of any accidents, injuries or occupational illnesses that occur on the project, regardless of the employer of the involved personnel or the owner of the involved materials or equipment. For OSHA recordable injuries, the subcontractor shall also furnish a copy of the OSHA Form 301(or equivalent) to the Project Representative within five days of the injury.

B. In the event a job site accident occurs, the contractor shall immediately implement controls and restrictions on the accident site to ensure the site remains undisturbed until released in writing by the OWNER to resume work. The con-

tractor shall provide accident investigation follow-up and shall support Owner's accident Investigation and reporting protocol.

C. The contractor shall promptly report to the Project Representative any spill, deposit, leak, drainage, debris, residue, spoil, residual, and/or by-product, whether its presence at the jobsite is occasioned by accident, inadvertence, intent, discarding, or abandonment by the Subcontractor or its lower tier subcontractors. This reporting requirement applies to petroleum products, oil, lubricants, chemical substances, waste materials, and waste substances, which are in such quantities as to constitute a hazardous substance or hazardous waste. All such occurrences of any quantity involving paints, solvents, thinners, degreasers, PCBs, halogenated hydrocarbons, volatile organic compounds, and/or asbestos shall be deemed a reportable event. These identification and reporting requirements shall be the responsibility of the contractor for both its own work forces as well as for any sub tier contractor, material man or supplier performing work on site for the contractor. Reporting shall be made to the Owner's Project Representative. In no event shall the Owner's Project Representative remove any spill(s) identified as a hazardous substance or hazardous waste from the OWNER without prior direction. All removal, cleanup, and associated costs, which result from contractor or lower tier subcontractor, material man, or supplier presence at the jobsite, shall be at the Subcontractor's sole expense. Either OWNER personnel or the contractor under the supervision of authorized City representative shall effect removal, cleanup and associated remedial measures at the exclusive option of the Owner.

3.22. WASTE MANAGEMENT

A. In accordance with the City's management practice, all contractors shall reduce, reuse, salvage, and/or recycle construction waste to the extent that is feasible.

B. Construction Waste Management:
   1. Recycle all recyclable material. This includes any material for which there is a recycling facility in Wisconsin.
   2. Separate all waste material in plastic, metal, paper, acoustical tile, brick, concrete, clean wood, glass, gypsum drywall, carpet and insulation and provide designated on-site collection areas.
   3. Keep track of volume and weight of each material and track if it was recycled or disposed otherwise.
   4. Keep track of volume and weight of donated material and site reused on site
   5. Haul all recyclable material to recycling facility if one is available in the county at no cost to the City.
   6. It is permissible to separate waste off-site by specialized recycling contractor. This contractor needs to be provide proof of recycling and needs to be WASTECAP certified as "Accredited Professional in Construction and Demolition Debris Recycling".

C. Waste materials removed from the site shall be managed by the contractor and disposed of in accordance with all applicable laws, regulations, codes, rules, and standards. The Contractor shall prepare all hazardous wastes for transport and disposal. Arrangements for disposal shall be coordinated through City's Project Representative. Charges for transport and disposal of hazardous waste by the City's hazardous waste service contractor will be paid directly by the City. Other materials such as soil, debris, sludge, water, etc. generated by project activities which may contain constituents exceeding federal, state, or local environmental cleanup standards must not be removed from the site, or treated and disposed on site without prior written approval of City. City may or may not provide a list of acceptable offsite disposal or treatment facilities for disposal by Contractor.

D. Prior to demolition or construction activities, the General Contractor, with input of all contractors and their subcontractors, shall develop and submit a Waste Management Plan to City. Priority is given to reuse, followed by recycling followed by disposal including proper land filling or incineration. Disposal only will be acceptable if other methods are not commercially available. The Waste Management Plan includes but is not limited to the following:
   1. A list of each material proposed to be salvaged, reused, or recycled, Materials to be included, at a minimum, are the following:
      a. Concrete: Clean concrete, concrete with rebar, asphalt concrete.
      b. Metals: Steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass or bronze, including banding, ductwork, framing, roofing and siding, flashing, piping and rebar.
      c. Clean Fill: Earth, rocks, and gravel.
      d. Wood: Clean dimensional wood, wood pallets, engineered wood products including plywood, particleboard, I joist.
      e. Biodegradable landscaping materials.
      f. Cardboard, paper, packaging.
      g. Masonry: Brick, ceramic tile, CMU.

h. Roofing: Clay or concrete tiles, asphalt shingles.
i. Gypsum board.
j. Acoustic ceiling panels.
k. Carpet and pad.
l. Paint.
m. Insulation.
n. Plastics: ABS, PVC
o. Beverage containers
p. Cardboard.
q. Concrete
r. Brick and concrete masonry units (CMU).
s. Metals from banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
t. Gypsum wallboard.
u. Clean dimensional wood
v. Wood doors
w. Acoustical ceiling tiles/panels
x. Glass

2. Separation and Materials Handling Procedures: How waste materials (as identified above), will be separated, cleaned (if necessary) and protected from contamination.
3. Waste Material Estimating Sheet (Appendix A at the end of this Section)
4. Proposed Alternatives to Land filling: List each material planned to be salvaged or recycled, quantities, and proposed destination.

E. The General Contractor shall be responsible for coordination of separation, handling, recycling, salvage, reuse, and return methods to be used by all contractors and for reporting the results of the Waste Management Plan. The contractor shall provide separation, bins for temporary onsite storage, handling, transportation, recycling, salvage, and land filling for all demolition and waste materials and keep recycling and waste bins areas neat, clean and clearly marked in order to avoid contamination or mixing materials and maintain logs onsite for each load of materials removed from site.

F. During the progress of the work, the General Contractor shall report to City, the quantity of each material recycled, reused, or salvaged, and the receiving party. All contractors shall maintain a record of weight tickets, manifests, receipts, and invoices for review by City on request.

G. At the completion of the project the General Contractor shall submit a final summary of the progress reports, including the percentage of recycled waste (weight or volume) to the quantity of waste that would have been otherwise land filled.

H. Contractor is to provide the following documents upon request for payment:
1. Waste Materials Estimating Sheet (Appendix A at the end of this Section)
2. Landfill Log (Appendix B at the end of this Section)
3. Waste Diversion Log (Appendix C at the end of this Section)
4. Legible copies of manifests, weight tickets, and receipts. Manifests shall be from recycling and/or disposal site operators that can legally accept the materials for the purpose of reuse, recycling or disposal. These documents shall include the contract number and the job site name.

I. Examples of documents include, but are not limited to:
1. Cover sheet for hazardous materials recycling contract
2. Vendor “Pickup Request”
3. Vendor “Certificate of Recycling and/or Disposal”
4. Vendor invoice

J. Maintain at the Project site Landfill Logs and Waste Diversion Logs for each load of materials removed from site.

K. Discuss Waste management plans and implementation during all construction-related meetings.

L. Immediately Inform the City Engineer if hazardous materials are encountered or suspected, and stop work in the suspect area. Do not proceed with work in the suspect area until approved by the City Engineer.

M. The following resources are provided for information only, to aid the Contractor in managing the construction waste:
   1. The Wisconsin DNR, Bureau of Waste Management
   2. http:/www.dnr.state.wi.us/org/aw/wm/
   3. The UW-Extension's Solid and Hazardous Waste Education Center
   4. http://www1.uwex.edu/ces/shwec/ , email shwec@uwm.edu or telephone: 608-262-0385.
   5. WasteCap Wisconsin, Inc.
   6. http://www.wastecapwi.org or telephone: 414-961-1100 or 608-245-1100

N. The contractor shall provide summaries of type and amount of material recycled, reused or disposed off. Those summaries shall include enough information and detail to satisfy requirements by external auditors. At a minimum the documentation needs to meet the current LEED requirements and requirements set by the EPA and federal government for federally funded projects. These requirements may or may not be mentioned specifically in this contract and the contractor is required to learn about specifics and to add documentation as required by such third party auditors.

3.23. EROSION CONTROL AND STORM WATER MANAGEMENT

A. In accordance with state law, where applicable, the General Contractor shall be governed by the following:

B. The General Contractor hereby covenants to maintain all project grounds, public streets and associated areas, including fill areas in a manner consistent with state laws and the general policy to conserve soil and soil resources, and to control and prevent soil erosion and to control and prevent siltation into waters of the state. This clause is to be liberally construed to further the above stated objectives. The following shall include, but not limit areas in which control is to be executed:

C. Erosion Control Plan: Implement the erosion control plan developed for the project and maintain erosion control practices throughout the construction period. Modifications to the erosion control plan, addressing phases of construction shall be the responsibility of the General Contractor. Erosion control practices that are compromised as the result of construction activity shall be returned to their functioning state by the end of the current workday. Where applicable, erosion control practices shall comply with Chapters NR 151 and 216, Wis. Adm. Code.

D. Minimum Stripping: Limit stripping of sod and vegetation and limit land disturbance to an area and a time period that will expose bare soil to least possibility of erosion that construction requirements will allow.

E. Stockpiling: Materials, including soil, shall be stored and protected in a manner that will prevent runoff of material from the stockpiles into streets, drainage facilities, storm sewer systems, or waters of the state in the event of rain.

F. Soil Erosion and erodible Materials: Take positive measures to prevent soil erosion from the construction area and areas disturbed by construction activities by employing such means as seed and mulch, mulches, intercepting embankments and berms, sedimentation basins, ditch checks, riprap, erosion mats, silt fence, approved polyacrylamides, inlet protection, or other temporary erosion control devices or methods.

G. Record Keeping: Maintain a copy of the current erosion control plan on site. Maintain maintenance records and inspection logs on-site for erosion control and storm water management practices. Contractor shall provide project representative with a weekly maintenance and inspection report.

H. Street Maintenance: Control the tracking of soil onto street and paved surfaces to a minimum. Any such tracking shall be removed no less than on a daily basis.

I. Storm Water Management: Practices installed for post-construction storm water management shall be protected during construction activity, and in the event that their intended function becomes compromised during construction activity, shall be restored and/or repaired according to Chapters NR 151 and 216, Wis. Adm. Code, for post-construction storm water management. Erosion control and storm water management practices shall be installed and maintained in accordance with the WDNR approved technical standards available at the following website: http://dnr.wi.gov/org/water/wm/nps/stormwater/techstds.htm

J. Responsibility and authority for inspections are vested in the City. Responsibility and authority for maintaining records for NR 216 is the responsibility of the General Contractor.

K. The contractor' s storm drain protective actions shall include but not be limited to:
   1. Identification of storm drain inlets that may be affected by this subcontract work and installation of needed protective filters and structures
   2. Regular inspection and maintenance of drain inlet protective assemblies
   3. Soils erosion and sediment control
   4. Proper storage and containment of soil and other material stockpiles to prevent them from running off into storm catch basins
   5. Effective management of vehicular and equipment site ingress and egress to avoid mud tracking
   6. Collection and proper disposal of waste material and slurry from concrete, mortar, or saw cutting work
   7. Collection and proper disposal of waste water resulting from washing or hydro blasting of equipment, vehicles or buildings
   8. Contingency plans for containing and disposing spills from sewer lines
   9. Training of personnel in housekeeping practices aimed at protecting storm drains during construction.

END OF SECTION

APPENDIX A - WASTE MATERIALS ESTIMATING SHEET

Instructions: Use as many sheets as needed.

PROJECT TITLE: _____

COMPANY: _____

DATE: _____

		Total Amount Generated		Amount Recycled		Amount Salvaged		Amount Sent to Landfill	
Material	Destination	Tons	Cu Yds	Tons	Cu Yds	Tons	Cu Yds	Tons	Cu Yds
Total									

APPENDIX B - LANDFILL LOG

Instructions: Use as many sheets as needed.

Project Title: _____

Company: _____

Log Dates: ___ ____ through ___

Date	Destination	Cubic Yards Land filled	Tons Land filled
Total			

APPENDIX C - WASTE DIVERSION LOG

Instructions: Use as many sheets as needed.

Project Title: _____

Company: _____

Log Dates: ___ ____ through ___

Material	Date	Destination	Salvaged	Recycled	Tons	Cubic Yards	Cost
Total							

SECTION 26 05 00
GENERAL ELECTRICAL WORK REQUIREMENTS

Contents

PART 1 - GENERAL

1.1. SCOPE

A The work under this section includes basic electrical requirements, which are applicable to all sections. This section includes information common to two or more technical specification sections or items that are of a general nature, not conveniently fitting into other technical sections. Included are the following topics:

1.2. RELATED WORK

A Applicable provisions from all sections govern work under this section.

1.3. REFERENCE STANDARDS

A Abbreviations of standards organizations referenced in this and other sections are as follows:

1. ANSI American National Standards Institute
2. ASTM American Society for Testing and Materials
3. EPA Environmental Protection Agency
4. ETL Electrical Testing Laboratories, Inc.
5. IEEE Institute of Electrical and Electronics Engineers
6. IES Illuminating Engineering Society
7. ISA Instrument Society of America
8. NBS National Bureau of Standards
9. NEC National Electric Code
10. NEMA National Electrical Manufacturers Association
11. NESC National Electrical Safety Code
12. NFPA National Fire Protection Association
13. UL Underwriters Laboratories Inc.
14. ANSI/NFPA 70 National Electrical Code.
15. ASTM A 123 Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip.
16. ASTM A 525 General Requirements for Steel Sheet, Zinc-Coated Galvanized by the Hot-Dip Process.
17. ASTM A 607 Specification for Steel Sheet and Strip, Hot-rolled and Cold-Rolled, High Strength, Low-Alloy Columbium and/or Vanadium
18. ASTM B 633 Specification for Electro-deposited Coatings of Zinc on Iron and Steel
19. NEMA VE 1 Metallic Cable Tray Systems.

B All work and materials are to conform in every detail to applicable rules and requirements of the Wisconsin State Electrical Code Volumes 1 and 2, the National Electrical Code (ANSI/NFPA 70), other applicable National Fire Protection Association codes, the National Electrical Safety Code (ANSI/IEEE C2), and present manufacturing standards (including NEMA).

C All work shall be done under the direction of a currently certified State of Wisconsin Certified Electrician. This person also has to be licensed to conduct electrical work in the City of Madison.

1.4. QUALITY ASSURANCE

A All materials shall be listed by and shall bear the label of an approved electrical testing laboratory. 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 City, 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, except for medium voltage equipment and components, shall be so labeled.

B The cable materials and manufacture shall meet or exceed all applicable requirements of the latest editions of ICEA Standard S-93-639, AEIC and NEMA standards. The cable shall be manufactured using the triple tandem extrusion process in which all layers, from the conductor to, and including, the tape shield jacket, are installed at essentially the same time without an intervening storage period on reels or other storage devices.

C The Contractor shall be a company specializing in installation of the used voltage cable and accessories with a minimum of five years documented experience in installation of the type of cable and accessories required for the work.

D The electricians employed for this work shall be experienced in the used voltage cable installation. Workmen involved in splicing and termination of cables shall have been specifically trained in the procedures required for the splices and terminations used in this project. At the discretion of the Engineer, documentation of experience and/or training in medium voltage cable splicing and termination shall be furnished by the Contractor.

E Cable and equipment shall be stored according to manufacturer's recommendations as a minimum. In addition, cable must be stored in a location protected from vandalism and weather. If cable is stored outside, it 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 be stored off site at the Contractor's expense.

1.5. PROJECT RECORD DOCUMENTS

A Accurately record exact sizes, lengths, types, locations, and quantities of cables. Also show where all splices are located for each cable.

PART 2 - PRODUCTS

2.1. GENERAL

A. Manufacturers: Legrand (Commercial Series unless specified differently), Hubble (Commercial Series unless specified differently)

B. All steel fittings and conduit bodies shall be galvanized.

C. No cast metal, split or gland type fittings permitted.

D. Condulets larger than 2 inch (50 mm) not permitted except as approved or detailed.

E. All condulet covers must be fastened to the condulet body with screws and be of the same manufacture.

F. Wireways and gutters shall not be used in lieu of pull boxes and condulets.

G. All boxes shall be of sufficient size to provide free space for all conductors enclosed in the box and shall comply with NEC requirements.

2.2. DUCTS

A UNDERFLOOR DUCT:

1. Configuration: One or Two level system using ducts in parallel runs as shown on Drawings.
2. Service: 120 volt power, standard size; telephone, extra width size; computer data, extra width size; extra width size as shown on drawing.
3. Standard Size: 1.5 x 3 inches (38 x 76 mm) nominal.
4. Extra Width Size: 1.5 x 6 inches (38 x 152 mm) nominal.
5. Provide precut 1-1/4 inch (32 mm) diameter holes on 24-inch (610 mm) centers. Close with flat metal screw plugs.
6. Single Level Junction Boxes: Rectangular cover and trim, adjustable height. Provide internal barriers, conduit and duct entrances, and extension rings as required.
7. Two Level Junction Boxes: Rectangular cover and trim, adjustable height; separate enclosures for each service to allow feeder ducts to cross under distribution ducts. Provide conduit and duct entrances and extension rings as required.
8. Junction Box Cover Plate: Provide tile trim plate flush with finished floor or smooth cover plate flush with concrete floor. Or carpet trim holders of proper depth depending on location or shown on drawing.
9. Supports: Adjustable before concrete placement.

Voice and data shall be separated per TIA 568 and 569 !!!!

B UNDERGROUND DUCT:

1. Conduit:
   a) Size: 5” nominal for voltages above 600V, and 4” nominal for 600Vor lower and communication.
   b) Material: Rigid polyvinyl chloride (PVC) marked at uniform intervals to indicate the kind of material; type Schedule 40 heavy wall, type EB-20 (TC-6), or type EB-35 (TC-8). Type EB PVC conduit is designed for use only in concrete encased installation.
   c) Elbows: Material to match conduit; minimum bend radius of 36 inches (915 mm).

d) Spacers: Plastic, to maintain 3” minimum between conduits.
e) Conduit Terminations in Manholes and Buildings:
f) Bell Ends: Manufactured bell ends of appropriate sizes at each end of conduit. When entering a new building or a new manhole a pre-manufactured PVC bell end system (as manufactured by Formex or similar) with conduit seals, provisions for roughing into the concrete and water stops is allowed.
g) Bushings: Steel-grounding bushings shall be used on all metal conduit entering a building or manhole.
h) Seals: When entering an existing building or manhole below grade, the concrete shall be core drilled for the appropriate size conduit and seal. The seal shall be a mechanical interlocking assembly of modular rubber links properly sized to fit the pipe and tightened in place, in accordance with the manufacturer’s instruction.
i) Plugs: Closure plugs or caps of same material as conduit on empty conduits at building entrances and at terminations in equipment pedestals to prevent the entrance of moisture and gases.
j) Pull Tape: Polyester pull tape, ½” width, tensile strength of 1,250 lbs. and sequential footage markings along the entire length of the tape as manufactured by Greenlee, Carlon, Garvin Industries, or Neptco (Muletape). Install pull tape in each empty duct.

2. Grounding: Steel grounding bushings shall be grounded to manhole or junction box ground.
3. Drainage Assembly: All ducts shall drain to an open end - preferably a manhole.
4. Concrete Encasement:
   a) Concrete used throughout shall be ready mixed concrete furnished by an approved mixing plant. The plant shall comply with the requirements of National Ready Mixed Concrete Association certification plan.
   b) The concrete mix used with type Schedule 40 heavy wall conduit shall be 3000-psi minimum, 3/4” aggregate, 5” to 6” slump.
   c) The concrete mix used with type EB-20 (TC-6), or type EB-35 (TC-8) thin wall conduit shall be 2500 psi minimum, 3/8” aggregate, 7” to 8” slump.
   d) The slump should be just enough to allow the mix to flow to the bottom of the formation and yet not be so wet as to cause the ducts to float.
   e) Encase duct with 3 in. minimum of concrete on top, bottom, and sides with top of duct bank troweled to a crown to prevent pooling of water.
5. Reinforcing Steel: Provide reinforcing steel the entire length of the duct system, four - #4 bars - one in each corner, minimum, or as shown on the drawings. Tie or dowel the reinforcement steel into the connecting walls of manholes, vaults and buildings, etc. to protect against vertical shearing.

2.3. FLOOR AND FLUSH MOUNTED SERVICE FITTINGS

A Pedestal Convenience Receptacle:
1. Housing: Satin aluminum.
2. Device Plate: Stainless steel.
3. Configuration: Two duplex, back-to-back

B Flush Cover Convenience Receptacle:
1. Material: Aluminum
2. Configuration: Duplex threaded opening.

C Pedestal Communication Outlet:
1. Housing: Satin aluminum.
2. Device Plate: Stainless steel.
3. Configuration: One bushed opening, 1 inch (25 mm) inside diameter.

D Flush Cover Communication Outlet:
1. Material: Aluminum
2. Configuration: 2-1/8 x 1-inch (54 x 25 mm) combination threaded opening.

E Pedestal Combination Fitting:
1. Housing: Satin aluminum.
2. Device Plate: Stainless steel.
3. Configuration: One duplex convenience receptacle with one bushed opening, 1 inch (25 mm) inside diameter.

F Flush Cover Combination Fitting:
1. Material: Aluminum
2. Configuration: Duplex threaded opening with 2-1/8 x 1-inch (54 x 25 mm) combination threaded opening.

2.4. TRAYS

A LADDER-TYPE CABLE TRAY:
1. Description: NEMA VE 1, Class 8C ladder type tray.
2. Material: Steel or Aluminum or as shown on drawing.
3. Finish (steel tray only): ASTM A 123, hot dipped galvanized after fabrication
4. Inside Width: As indicated or needed with 50% spare capacity
5. Inside Depth: As indicated or needed with 50% spare capacity. Inside depth shall be measured from the top of rail to the top of rung.
6. Straight Section Rung Spacing: As indicated or needed with 50% spare capacity.
7. Inside Radius of Fittings: As indicated or needed with 50% spare capacity.
8. Provide manufacturer's standard clamps, hangers, brackets, splice plates, reducer plates, blind ends, barrier strips, connectors, and grounding straps.
9. Covers: Flanged, solid, ventilated, flush, raised cover. As indicated or needed.

B TROUGH-TYPE CABLE TRAY:
1. Description: NEMA VE 1, Class 8C trough type tray.
2. Material: Steel or Aluminum or as shown on drawing.
3. Finish (steel tray only): ASTM A 123, hot dipped galvanized after fabrication
4. Inside Width: As indicated or needed with 50% spare capacity
5. Inside Depth: As indicated or needed with 50% spare capacity. Inside depth shall be measured from the top of rail to the top of rung.
6. Inside Radius of Fittings: as indicated or needed.
7. Provide manufacturer's standard clamps, hangers, brackets, splice plates, reducer plates, blind ends, barrier strips, connectors, and grounding straps.
8. Covers: Flanged, solid, ventilated, flush, raised cover. As indicated or needed.

C SOLID-BOTTOM-TYPE CABLE TRAY:
1. Description: NEMA VE 1, Class 8C trough type tray.
2. Material: Steel or Aluminum or as shown on drawing.
3. Finish (steel tray only): ASTM A 123, hot dipped galvanized after fabrication
4. Inside Width: As indicated or needed with 50% spare capacity
5. Inside Depth: As indicated or needed with 50% spare capacity. Inside depth shall be measured from the top of rail to the top of rung.
6. Inside Radius of Fittings: as indicated or needed.
7. Provide manufacturer's standard clamps, hangers, brackets, splice plates, reducer plates, blind ends, barrier strips, connectors, and grounding straps.
8. Covers: Flanged, solid, ventilated, flush, raised cover. As indicated or needed.

D CHANNEL-TYPE CABLE TRAY:
1. Description: NEMA VE 1, Class 8C trough type tray.
2. Material: Steel or Aluminum or as shown on drawing.
3. Finish (steel tray only): ASTM A 123, hot dipped galvanized after fabrication
4. Inside Width: As indicated or needed with 50% spare capacity
5. Inside Depth: As indicated or needed with 50% spare capacity. Inside depth shall be measured from the top of rail to the top of rung.
6. Inside Radius of Fittings: as indicated or needed.
7. Provide manufacturer's standard clamps, hangers, brackets, splice plates, reducer plates, blind ends, barrier strips, connectors, and grounding straps.
8. Covers: Flanged, solid, ventilated, flush, raised cover. As indicated or needed.

2.5. CONDUIT

A RIGID METAL CONDUIT AND FITTINGS:

1. Rigid Steel Conduit: ANSI C80.1 and UL 6, RMC full-weight pipe, hot-dip galvanized with threaded ends, top coated outside to protect against white rust, coupling on one end, plastic cap on both ends; Republic Conduit, Allied Tube and Conduit, Wheatland Tube Company or equal.
2. Rigid Aluminum Conduit: ANSI C80.5 and UL 6A; ARC, full-weight pipe, built to the same standards as rigid steel conduit with threaded ends, coupling on one end, plastic caps on both ends; Republic Conduit, Allied Tube and Conduit, Wheatland Tube Company or equal.

B PVC COATED RIGID METAL CONDUIT:

1. PVC Externally Coated Conduit: Rigid heavy wall, schedule 40, steel conduit with external 40 mil (0.1 mm) PVC coating. Conduit must be hot dipped galvanized inside and out including threads. The PVC coating bond to the galvanized steel conduit shall be stronger than the tensile strength of the coating itself.
2. Fittings and Conduit Bodies: Threaded type, material to match conduit. PVC coated fittings and couplings shall have specially formed sleeves to tightly seal to conduit PVC coating. The sleeves shall extend beyond the fitting or coupling a distance equal to the pipe outside steel diameter or two inches (50 mm) whichever is greater.

C INTERMEDIATE METAL CONDUIT (IMC) AND FITTINGS:

1. Intermediate Metal Conduit: ANSI C80.6 and UL 1242, IMC, high strength steel metal pipe, hot dip galvanized with threaded ends, top coated to avoid white rust, coupling on one end, plastic caps on both ends, interior coated with highly corrosion resistant lubricating finish for easier wire pulling; Republic Conduit, Allied Tube and Conduit, Wheatland Tube Company or equal.

D ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS

2. Conduit: Steel, galvanized tubing.
3. Fittings: All steel, set screw, concrete tight. No push-on or indenter types permitted.
4. Conduit Bodies: All steel threaded conduit bodies.

E FLEXIBLE METAL CONDUIT AND FITTINGS:

1. Conduit: WW-C-566; steel; liquid-tight, interlocking single-strip type with overall molded jacket to exclude moisture; "Sealtite," Condu-Flex, or equal.
2. Fittings and Conduit Bodies: NEMA FB 1; steel; clamp or screw-in type.
3. Flexible Conduit Connectors: Thomas and Betts, Appleton Electric Co. or equal, galvanized steel with integral insulated throat.
4. Fittings and Conduit Bodies: All steel, galvanized, or malleable iron

F LIQUIDTIGHT FLEXIBLE METAL CONDUIT AND FITTINGS:

1. Conduit: flexible, steel, galvanized, spiral strip with an outer Liquidtight, nonmetallic, sunlight-resistant jacket.
2. Fittings and Conduit Bodies: ANSI/NEMA FB 1, compression type. There shall be a metallic cover/insert on the end of the conduit inside the connector housing to seal the cut conduit end.

G ELECTRICAL NONMETALLIC TUBING (ENT) AND FITTINGS:

1. Conduit: ENT (smurf tube), UL listed and NEC recognized.
2. Fittings: One piece quick connect fittings for 1/2 inch to 1 inch size and schedule 40 cemented fittings for larger size. When installed in concrete, fittings shall be suitable for damp locations and shall be concrete–tight, stub-ups and stub-downs kits shall meet manufacturer's recommendations.

H RIGID NONMETALLIC CONDUIT AND FITTINGS:

1. Conduit: Schedule 40 PVC minimum, Listed, sunlight resistant, rated for 90^0 C conductors.
2. Fittings and Conduit Bodies: NEMA TC 2, Listed.

2.6. SURFACE RACEWAY

A. METAL:

1. Description: Sheet metal channel with fitted cover, suitable for use as surface metal raceway.
2. Sized to contain 2 times the wire installed for further expansion of systems.
3. Finish: Ivory

4. Fittings: Couplings, elbows, and connectors designed for use with raceway system.
5. Boxes and Extension Rings: Designed for use with raceway systems.

B. NONMETAL:
1. Description: Nonmetallic channel with fitted cover, suitable for use as surface raceway.
2. Sized to contain 2 times the wire installed for further expansion of systems.
3. Finish: Ivory
4. Fittings: Couplings, elbows, and connectors designed for use with raceway system.
5. Boxes and Extension Rings: Designed for use with raceway systems.

2.7. BOXES

A. OUTLET BOXES:
1. Sheet Metal Outlet Boxes: galvanized steel, with stamped knockouts.
2. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 3/8 inch male fixture studs where required.
3. Concrete Ceiling Boxes: Concrete type.
4. Cast Boxes: Cast ferroalloy, or aluminum type deep type, gasketed cover, threaded hubs.

B. FLOOR BOXES:
1. Floor Boxes for Installation in Cast-In-Place Concrete Floors: Full adjustable, cast iron or formed steel. s indicated on drawings or needed

C. PULL AND JUNCTION BOXES:
1. Pull boxes and junction boxes shall be minimum 4-inch square (100 mm) by 2 1/8th inches (54 mm) deep for use with 1-inch (25 mm) conduit and smaller. On conduit systems using 1 1/4 inch (31.75 mm) conduit or larger, pull and junction boxes shall be sized per NEC but not less than 4 11/16 inch square (117 mm).
2. For telecommunication, fiber optic, security, and other low voltage cable installations the NEC box size requirements shall apply. All boxes, used on telecommunication, security, other low voltage and fiber optic systems with conduits of 1 1/4" and larger, shall be sized per the NEC conduit requirements. For determining box size, the conduit is the determining factor not the wire size.
3. Sheet Metal Boxes: code gauge galvanized steel, screw covers, flanged and spot welded joints and corners.
4. Sheet Metal Boxes Larger Than 12 Inches (300 mm) in any dimension shall have a hinged cover or a chain installed between box and cover.
5. Cast Metal Boxes for Outdoor and Wet Location Installations: Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as raintight. Galvanized cast iron or aluminum box and cover with ground flange, neoprene gasket, and stainless steel cover screws.
6. Fiberglass or Concrete Handholes with weatherproof cover of non-skid finish shall be used for underground installations.
7. Box extensions and adjacent boxes within 48" of each other are not allowed for the purpose of creating more wire capacity.
8. Junction boxes 6" x 6" or larger size shall be without stamped knockouts.
9. Wireways shall not be used in lieu of junction boxes.

2.8. MULTI-OUTLET ASSEMBLY

A. Description: Sheet metal channel with fitted cover, or with pre-wired receptacles, suitable for use as a multi-outlet assembly.

B. Sized to contain 2 times the wire installed for further expansion of systems.

C. Receptacles: Provide covers and accessories to accept convenience receptacles

D. Finish: Almond

E. Fittings: Couplings, elbows, and connectors designed for use with multi-outlet system.

2.9. AUXILIARY GUTTERS (Wireways)

A. Description: General purpose, Oil-tight and dust- tight or Rain-tight as indicated on drawings or needed type wireway without knockouts.
   1. Sized to contain 2 times the wire installed for further expansion of systems.
   2. Cover: Hinged or, Screw applied cover with full gasketing. as indicated on drawings or needed
   3. Connector: Slip-in construction; Flanged; hinged cover or screw applied cover. s indicated on drawings or needed
   4. Fittings: Lay-in type with removable top, bottom, and side; captive screws or drip shield. s indicated on drawings or needed Finish: Rust inhibiting primer coat with gray enamel finish.

2.10. CORDS AND CAPS

   1. Straight-blade Attachment Plug: NEMA WD 1.
   2. Locking-blade Attachment Plug: NEMA WD 5.
   3. Attachment Plug Configuration: Match receptacle configuration at outlet provided for equipment.
   4. Cord Construction: Oil-resistant thermoset insulated multiconductor flexible cord with identified equipment grounding conductor, suitable for hard usage in damp locations.
   5. Cord Size: Suitable for connected load of equipment and rating of branch circuit overcurrent protection.

2.11. CONDUCTORS

A. All conductors must be suitable for the application intended and made off 98% copper. Conductors #10 and larger must be stranded. Conductors #12 and smaller may be solid or stranded with the following requirements or exceptions:
   1. All conductors terminated with crimp type devices must be stranded. Stranded conductors may only be terminated with UL OR ETL Listed type terminations or methods: e.g. stranded conductors may not be wrapped around a terminal screw but must be terminated with a crimp type device or must be terminated in an approved back wired method.
   2. Damaged cable or wire is to be removed from job site immediately.
   3. All cable shall be new, delivered to the site, and be less than two years since manufacture. It shall be from manufacturer's stock; not suppliers' warehouse stock. Manufacturer's certification of factory test values shall be submitted for all cable furnished. All specified dimensions are nominal.
   4. Provide a 600-volt insulated copper ground conductor in all conduits with medium and low voltage cable. This ground conductor shall be the same size as the phase conductors.
   5. In mechanical rooms, light fixtures, and other high temperature applications, the insulation shall be rated 90 degrees C. Other areas shall use insulation rated 75 degrees C unless stated otherwise in other parts of these specifications and drawings.
   6. All conduit sized to have less than 2% voltage drop
   7. Circuits with more than 100 feet length shall employ wire at least 2 numbers larger than required by NEC (i.e. #10 wire for 20-amp circuit instead of # 12)

B. BUILDING WIRE:
   1. Description: Single conductor insulated wire.
   2. Insulation:
      a. Type THHN/THWN, XHHW-2 insulation for feeders and branch circuits.
      b. Type XHHW-2 insulation for feeders with aluminum conductors.

C. UNDERGROUND WIRE FOR EXTERIOR WORK:
   1. Description: Stranded single or multiple conductor insulated wire.
   2. Insulation: Type XHHW-2 or USE.

D. MODULAR WIRING SYSTEMS:
   1. Modular wiring systems shall be UL or ETL Listed for the application, shall be pre-wired, plug-in, flexible metal conduit assemblies with polarized connectors.
   2. The assembly shall be constructed so there is no strain on the electrical plug itself. The flexible metal sheath shall be securely fastened to the fixture junction box. The electrical connection shall be a plug/jack connection inside of the junction box.
   3. The distribution may be either central distribution box or daisy chain type.

4. Do not use for receptacle branch circuits.
5. Modular wiring systems shall not be used to supply power to receptacles except within landscape type furniture where the entire furniture system is Listed as a System.
6. Landscape furniture shall be connected to wall junction boxes with flexible metal conduit hardwired to junction boxes at each end. Plug in connectors shall not be used.

E. REMOTE CONTROL AND SIGNAL CABLE:
1. Refer to specific section for requirements for cable to be used on fire alarm system. Refer to specific section for requirements for cable to be used on communication systems. All other systems cabling shall meet the requirements of NEC Article 725 and the following:
    a. Control Cable for Class 1 Remote Control and Signal Circuits: 600 volt insulation, individual conductors twisted together, [shielded], and covered with an overall PVC jacket. Cable shall be Listed, temperature rated, and plenum or non-plenum rated for the application as required in the National Electrical Code.
    b. Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits shall be constructed, Listed, temperature rated, and plenum or non-plenum rated for the application as required in the NEC Article 725.

F. WIRING CONNECTORS:
1. Split Bolt Connectors: Not acceptable.
2. Solderless Pressure Connectors: High copper alloy terminal. May be used only for cable termination to equipment pads or terminals. Not approved for splicing.
3. Spring Wire Connectors: Solderless spring type pressure connector with insulating covers for copper wire splices and taps. Use for conductor sizes 10 AWG and smaller.
4. All wire connectors used in underground or exterior pull boxes shall be gel filled twist connectors or a connector designed for damp and wet locations.
5. Mechanical Connectors: Bolted type tin-plated; high conductivity copper alloy; spacer between conductors; beveled cable entrances.
6. Compression (crimp) Connectors: Long barrel; seamless, tin-plated electrolytic copper tubing; internally beveled barrel ends. Connector shall be clearly marked with the wire size and type and proper number and location of crimps.

G. GROUNDING MATERIAL:
1. Grounding Connectors shall meet or exceed UL 467 and be clearly marked with the catalog number, conductor size and manufacturer.
2. The mechanical connector bodies shall be manufactured from high strength, high conductivity cast copper alloy material. Bolts, nuts, washers and lockwashers shall be made of Silicon Bronze and supplied as a part of the connector body and shall be of the two bolt type.
3. The compression connectors shall be manufactured from pure wrought copper. The conductivity of this material shall be no less than 99% by IACS standards.
4. The connectors shall meet or exceed the performance requirements of IEEE 837, latest revision.
5. The installation of the connectors shall be made with a compression, tool and die system, as recommended by the manufacturer of the connectors.
6. The connectors shall be clearly marked with the manufacturer, catalog number, conductor size and the required compression tool settings.
7. Each connector shall be factory filled with an oxide-inhibiting compound.

H. Wire:
1. Material: Stranded copper (aluminum not permitted).
2. Grounding Electrode Conductor: Size as shown on drawings, specifications or as required by NFPA 70, whichever is larger.
3. Foundation Electrodes: As shown on drawings.
4. Manhole, Main Switchgear room and Vault Bonding: No. 4/0 minimum.

I. Bus:
1. Material: Copper (aluminum not permitted).

2. Size: 1/4" X 2" minimum.

J. MEDIUM VOLTAGE CABLE – SHIELDED:
1. Submit manufacturer's certificate stating approval for field acceptance testing per National Electrical Testing Association standards (at least 36 kV DC for 5 kV rated cable and 64 kV DC for 15 kV rated cable).
2. Submit manufacturer's certificate stating that medium voltage cable meets or exceeds all requirements specified below.
3. Usage: This cable shall be used for all above and under ground applications (except for jumper cable applications, see JUMPER CABLE below) and shall be contained in conduit or other raceways. It may be used in cable trays in electrical vaults only.
4. Cable: Single conductor, insulated cable rated 5 or 15 KV as indicated on drawings, 133% insulation level, ungrounded, NEC-UL Type MV-105. Sizes as indicated on the Drawings.
5. Conductor: Soft copper, annealed, uncoated, Class B compressed, compact, or concentric stranded, having nominal direct-current resistance equal to or less than that required in section 2.4.1 or 2.4.2 and Table 2-2 of ICEA S-93-639.
6. Conductor shield: extruded semiconductor with resistivity requirements of section 3.3 of ICEA S-93-639 for discharge-free designs and nonconducting high permittivity compound for discharge-resistant designs. Material shall be clean stripping from the conductor and firmly bonded to the overlying insulation.
7. Insulation for 5 KV cable: Extruded EPR (ethylene propylene rubber), rated at 5 KV, 133 per cent insulation level, minimum nominal thickness of .115 inches.
8. Insulation 15 kV cable: Extruded EPR (ethylene propylene rubber), rated at 15 KV, 133 per cent insulation level, minimum nominal thickness of .220 inches.
9. Insulation Shield: The insulation shield shall consist of an extruded semiconducting layer directly over the insulation and a copper tape over the semiconducting covering. The tape shall be at least 5 mils (0.127 mm) thick and be spiral wrapped with a minimum 12.5 per cent overlap. The insulation shield shall meet all requirements of section 5 of ICEA S-93-639.
10. Jacket: Polyvinyl Chloride (PVC), black color with a minimum nominal jacket thickness of 80 mils (2.03 mm), meeting all requirements of ICEA S-93-639.
11. Cable Rating: Continuous duty at 105 degrees C., wet or dry locations, suitable for underground duct installations, NEC-UL type MV-105.

K. JUMPER CABLE:
1. Usage: This cable may only be used as a flexible power lead between close-coupled equipment such as between the primary switch and the transformer. This cable may only be used where adequate through-air clearance can be achieved from conductor-to-conductor and from conductor-to-ground. It is not designed for and shall not be used in conduit or random lay applications.
2. Cable: Single conductor, flexible, non-shielded, insulated cable rated 15 KV, ungrounded. Sizes as indicated on the Drawings.
3. Conductor: Soft annealed copper, uncoated, concentric stranded.
4. Conductor shield: extruded semiconductor, clean stripping from the conductor and firmly bonded to the overlying insulation.
5. Insulation: Extruded EPR (ethylene propylene rubber), rated at 15 KV, minimum thickness of .175 inches
6. Cable Rating: Continuous duty at 90 degrees C., dry locations.

L. CABLE TERMINATIONS:
1. Modular Molded Shrink Type Termination: IEEE 48; Class 1; 5 or 15 KV. Kit form, suitable for use with cable specified, including slip-on type flexible skirted polymer or silicon rubber insulator. Termination shall be hot or cold shrink type with internal stress relief tube to distribute electric field (10% to 90% equipotential lines) over entire length of skirted insulator.
2. Submittal for approval shall show electric field distribution (via equipotential lines) of termination device.
3. Lugs shall be copper, long barrel, two hole or four hole and rated for the voltage applied. The lugs shall match the pads on the equipment to which the cable will be mounted. For example, if the equipment has a four-hole pad, the cable lug shall be four-hole type.
4. If there will be more than one cable on an equipment pad approved spiders (or spacers) must be used. Cable attachment to equipment must match the equipment manufacturers UL labeling requirements (if the equipment is

UL Listed) as a minimum. Unless the equipment is designed or listed for it, cable lugs may not be placed back to back on the equipment pad. In all cases, the termination and equipment must be taped with approved anti-tracking tape.

M. CABLE SPLICES:
1. Modular Molded Shrink Type Splice: IEEE 404-1986; Class 1; 5 or 15 KV. Kit form, suitable for use with cable specified, including slip-on type flexible polymer or silicon rubber insulator. Splice shall be hot or cold shrink type with internal stress relief tube to distribute electric field (10% to 90% equipotential lines) over entire length of insulating material.
2. Molded body shall contain a built-in internal semiconducting layer, which covers and contacts the splice barrel and the cable insulation layer to prevent electrical stress buildup inside the body. This semiconducting layer shall be bonded to and covered with a cured EPDM rubber or polymer-insulating layer, which, in turn, shall be bonded to and covered with a semiconducting layer and metallic shield and jacket.
3. Splicing sleeves shall be long barrel type and rated for the voltage applied.
4. The completed splice shall be approved for underground direct burial and water immersion service.
5. Submittal for approval shall show electric field distribution (via equipotential lines) of termination device.

N. CABLE LABELING:
1. Cable labels shall be engraved, laminated plastic plates suitable for use from -40 deg. F. to 150 deg. F., and shall be resistant to oil, water and solvents. Nameplate shall be minimum size 1-1/2" X 4". Face shall be white and the letters shall be black. Fasten label to cable with nylon tie-wraps. See paragraphs below for information type and label locations.

O. COLOR CODES:
1. Color code power conductors of wiring systems by means of colored insulation for sizes No. 8AWG and smaller. Color code larger conductors with 1-inch wide cloth or plastic colored adhesive tape on each end of the cables:

	480Y/277 System	208Y/120V System
Phase A	Brown	Black
Phase B	Yellow	Red
Phase C	Purple	Blue
Neutral	Gray	White
Travelers		Yellow
Equipment Ground	Green	Green

a. Wrap tape not less than two full turns around conductor.
b. Color code must be strictly maintained for Normal System and each Emergency/Stand-By System with Normal System colors carried through transfer switches to associated Emergency/Standby System conductors.
c. Equipment Grounding: Any conductor intended solely for equipment grounding purposes shall be green in color. Conductors with white insulation shall be used only for the grounded neutral conductors. This requirement applies to all power, lighting, and control circuits.

2.12. SURGE ARRESTERS (Above 600V)

A. All surge arresters shall be metal oxide varistor (MOV) type.

B. All surge arresters shall be distribution class.

C. 4160 volt system ratings: 3 kV rated, 2.55 kV MCOV, maximum discharge voltage at 10 kA (8 X 20 microsecond current wave) - 12.5 kV crest maximum.

D. 13,800 volt system ratings: 10 kV rated, 8.4 kV MCOV, maximum discharge voltage at 10 kA (8 X 20 microsecond current wave) - 36.0 kV crest maximum.

E. The manufacturer shall provide a 5 year warranty from the date of shipment.

F. Examine medium voltage transformers and looped switches for size and type of surge arrester to ensure physical compatibility.

2.13. LABELS

A. All labels shall be permanent, and machine generated. NO HANDWRITTEN OR NON-PERMANENT LABELS ARE ALLOWED.

B. Label size shall be appropriate for the conductor or cable size(s), outlet faceplate layout and patch panel design. All labels shall be self-laminating, white/transparent vinyl and be wrapped around the cable or sheath. Flag type labels are not allowed. The labels shall be of adequate size to accommodate the circumference of the cable being labeled and properly self-laminate over the full extent of the printed area of the label.

C. Nameplates: Engraved three-layer laminated plastic, black letters on a white background. Emergency system shall use white letters on red background.

D. Tape (phase identification only): Scotch #35 tape in appropriate colors for system voltage and phase.

E. Adhesive type labels not permitted except for phase and wire identification.

2.14. HANGERS AND SUPPORTS

A. Support Channel: Galvanized.

B. Hardware: Corrosion resistant.

C. Minimum sized threaded rod for supports shall be 3/8".

D. Conduit clamps, straps, supports, etc., shall be steel or malleable iron. One-hole straps shall be heavy duty type. All straps shall have steel or malleable backing plates when conduit is installed on the interior or exterior surface of any exterior building wall.

2.15. CONTACTORS

A. General Purpose Contactor:
   1. NEMA ICS 2, AC general purpose magnetic contactor
   2. Coil Voltage: as needed
   3. Poles: As scheduled
   4. Size: As scheduled or needed
   5. Enclosure: ANSI/NEMA ICS 6, Type [as scheduled].
   6. contact Rating: 50% above maximum current with protection against higher rush-in-current depending on application

B. Accessories:
   1. Pushbuttons and Selector Switches: NEMA ICS 2, [heavy duty type or general duty type as required by application].
   2. Indicating Lights: NEMA ICS 2, LED push-to-test type.
   3. Auxiliary Contacts: NEMA ICS 2, Class [A300 or A600 as required by application]

2.16. FUSES

A. 250 Volt Fuses:
   1. Fuses 600 Amperes and Less: Dual element, time delay, 250 volt, UL
   2. Interrupting Rating: 200,000 rms amperes.

B. 600 Volt Fuses:
   1. Fuses 600 Amperes and Less: Dual element, time delay, 600 volt, UL
   2. Interrupting Rating: 200,000 rms amperes.
   3. Fuses 601 Amperes and Larger: Time delay, 600 volt, UL Class L. Interrupting Rating: 200,000 rms amperes.

C. Provide enclosure for spare fuses. Fuses shall not be installed until equipment is ready to be energized.

D. Install spare fuse storage enclosure in Electrical Room.

2.17. WALL SWITCHES

A. Approved Manufacturers: Legrand "Commercial Grade Series", Hubble "Specification Grade Commercial Series"

B. Wall Switches for Lighting Circuits and Motor Loads Under 1/2 HP: Heavy duty use toggle switch, rated 20 amperes and 120/277 volts AC. Switches shall be UL20 Listed and meet Federal Specification WS-896. All switches shall be heavy duty Specification Grade with separate green ground screw.

C. All switches shall be back and side wired, screw clamp type, suitable for solid or stranded wire up to #10 AWG. Switches shall be Leviton model 1221-S, Hubbell model CS1221, Pass & Seymour model CSB20, Cooper model CSB120, or approved equal.

D. Handle: Almond, made of nylon or high impact resistant material.

2.18. RECEPTACLES

A. Approved Manufacturers: Legrand "Commercial Grade Series", Hubble "Specification Grade Commercial Series"

B. Convenience and Straight-blade Receptacles: NEMA Type 5-20R, ivory nylon or high impact resistant face. Receptacles shall be UL498 Listed and meet Federal Specification WC-596. All duplex receptacles shall be heavy duty Specification Grade, 20 amp rated. All receptacles shall be back and side wired, screw clamp type, suitable for solid or stranded wire up to #10 AWG, with a separate green ground screw. Receptacles shall be Leviton model 5362-S, Hubbell model CR5362, Pass & Seymour model CRB5362, Cooper model 5362C, or approved equal.

C. Generally, all receptacles shall be duplex convenience type unless otherwise noted.

D. All receptacles installed in outdoor locations, in garages, within 6 feet of the outside edge of sinks, and in other damp or wet locations shall be GFCI type in addition to those marked on drawings.

E. GFCI Receptacles: Duplex convenience receptacle, Specification Grade, with integral ground fault current interrupter meeting the requirements of UL standard 943 Class A and UL standard 498. GFCI receptacles shall be Leviton model 8899, Hubbell model GRF5352, Pass & Seymour model 2094 or approved equal.

F. All receptacles on emergency circuits shall have a red face.

G. All receptacles designated as isolated ground shall have an isolated ground triangle imprint on the face of the receptacle.

H. Locking-Blade Receptacles: As indicated on drawings.

2.19. DEVICE PLATES AND BOX COVERS

A. Approved Manufacturers: Legrand, Hubble

B. Decorative Cover Plate: Almond smooth thermoplastic nylon. Red plates on emergency outlets.

C. Weatherproof Cover Plate: Gasketed metal with hinged device covers.

   a. Use weather-proof covers in outdoor locations, and wet-locations (i.e. washbay) in addition to those marked on drawings.

D. Heavy duty Surface Cover Plate: Raised galvanized steel.

E. Cover schedule:

Type of Space	Cover type
Outdoors / wet and moist areas	Weather Proof
Finshied spaces (i.e. offices)	Decorative
Shops, Storage and Hallways and Walk areas of finished spaces (incl. offices)	Heavy Duty

2.20. FLOOR-MOUNTED SERVICE FITTINGS

A. Flush Covers for Duplex Convenience Receptacle: Aluminum flush cover suitable for floor box, with duplex-flap/duplex-threaded (whichever is specified elsewhere) opening. Provide Aluminum-finish protective rings for use with threaded openings.

B. Flush Covers for Communications: Aluminum flush cover suitable for floor box, with 2-1/8 x 1-inch combination threaded opening. Provide Brass/Aluminum (whichever is specified elsewhere) finish protective rings/split nozzle. Provide aluminum carpet rings.

2.21. POKE-THROUGH FITTINGS

A. Description: Assembly comprising service fitting, poke- through component, firestops and smoke barriers, and junction box for conduit termination.

B. Fire Rating: 3 hours.

C. Service Fitting:
   1. Type: Pedestal or Flush (decided in field by owner).
   2. Housing: Satin aluminum
   3. Device Plate: Stainless steel.
   4. Configuration: One duplex, Two duplex, back-to- back, One duplex and one communications outlet depending on drawing.

2.22. DISCONNECT SWITCHES

A. Fusible Switch Assemblies: NEMA Type HD; quick-make, quick-break, load interrupter, enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: designed to accommodate Class [R] [J] cartridge type fuses.

B. Nonfusible Switch Assemblies: NEMA Type HD; quick-make, quick-break, load interrupter, enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

C. Enclosure: NEMA Type 1.or 3R as indicated on drawings or required by application.

D. Provide manufacturer's equipment ground kit in all disconnect switches.

2.23. PANELS, CIRCUIT BREAKERS AND ENCLOSED SWITCHES

A. Manufacturers: Square D

B. Molded Case Circuit Breakers: Inverse time with integral thermal and instantaneous magnetic trip elements in each pole.

C. Electronic Trip Circuit Breaker: As scheduled on the drawings, electronic circuit breakers shall have, at a minimum, adjustments for long time trip and instantaneous trip. Provide integral ground fault sensing with adjustable ground fault trip where indicated on the drawings.

D. Ratings as shown on the Drawings.

E. Enclosure: NEMA AB 1; Type1.or 3R as indicated on drawings or required by application. Fabricate enclosure from steel.
F. Finish using manufacturer's standard gray enamel finish.

G. Provide accessories as scheduled, to NEMA AB 1 for enclosed switches:
   1. Shunt Trip Device
   2. Auxiliary Switch:
   3. Handle Lock:

PART 3 - EXECUTION

3.1. INSTALLATION

A. Use wire and cable with insulation suitable for temperatures encountered in heat-producing equipment.

B. Install pre-finished cord set where connection with attachment plug is indicated or specified, or use attachment plug with suitable strain-relief clamps.

C. Provide suitable strain-relief clamps for cord connections to outlet boxes and equipment connection boxes.

D. Install disconnect switches, controllers, control stations, and control devices such as limit switches and temperature switches as indicated. Connect with conduit and wiring as indicated.

E. Provide expansion fittings with suitable bonding jumper where duct crosses building expansion joints.

F. Terminate ducts for power service in bottom of panelboard or wireway using suitable fittings.

G. Terminate ducts for telephone service in bottom of telephone cabinet using suitable fittings.

H. Level cover plates flush with finished concrete floor.

I. Place rectangular plates square with wall lines.

J. Securely hold junction boxes and ducts in place during installation to avoid floating or other movement.

K. Close unused duct or conduit entrances to junction boxes. Seal duct terminations at junction boxes.

L. Ground and bond duct.

M. Install underfloor duct with tops of preset inserts 1/8 inch (3 mm) below finished floor line.

N. Place schedule on the inside of coverplate of each junction box indicating distance to first insert in each direction, measured from the center of the box. Use self-adhesive labels for schedule.

O. Use blank duct in permanent corridors, vestibules, passages, lobbies, for connecting parallel ducts less than 6 feet (1.8 m) apart, for feeder duct from cabinet or panelboard to first junction box, and where indicated.

P. Support Couplers and Supports: Join duct lengths using combination support couplers where practical. Provide additional supports at intervals of not over 5 feet (1.5 m), within 30 inches (750 mm) each side of junction boxes, and as close as practical to elbows, bends, and terminations.

Q. Install insert within 12 inches (30 mm) of edge of junction box. Align inserts on same centers for all services.
R. Do not extend inserts into special floor finishes, such as terrazzo, marble, or wood.

S. Install a duct marker in each insert adjacent to junction box, at end of each duct run, on both sides of permanent partitions, and on both sides of change of direction of duct. Install markers flush with finished floor material. In carpeted areas, install marker screws level with carpet backing.

T. Install surface service fittings after installation of floor finishes. Cut floors as necessary, following duct manufacturer's recommendations. Replace damaged floor construction and finish.

U. Install trench duct trim flush with coverplates; maintain covering of factory-applied tape for protection.

V. Clean ducts and fittings of debris and dust before installing wire and cable.

W. Pull wire and cable from outlet insert toward junction boxes.

X. Install branch circuit conductors continuous between junction box and farthest fitting. Do not cut conductor to make connections to receptacle devices.

3.2. CABLE TRAY

A. Install metallic cable tray in accordance with NEMA VE 1. Submit a complete detailed sketch for approval of the actual proposed method of installation. The approval of the installation method does not relieve this contractor from meeting the below deviation requirement. If additional support is needed, as determined by the project engineer, this contractor shall furnish and install the additional support at no additional cost to the City.

B. The Contractor shall coordinate the installation of the cable tray with plumbing and HVAC Contractors so that clearance is maintained between the cable tray and other trades work. This clearance shall be minimum of one (1) foot on both sides of the cable tray and eight (8) inches on top of the cable tray. If these conditions cannot be met, this Contractor shall notify the City Representative for clarification and direction before proceeding with installation.

C. No conduit shall be attached to the cable tray except for the conduits that terminate at the cable tray. Cable tray supports only, can be used to support conduit. Do not use more than 1/2 of the cable tray support for conduit support. Support trays in accordance with other sections. Provide supports at each connection point, at the end of each run, and at other points to maintain spacing between supports of 6 ft (1.8 m) maximum. Supports shall be constructed from formed shape channel members 1 5/8" x 1 5/8", pre-galvanized and 14 Ga. steel complete with nuts, bolts, washers, lock washers and tray clamps as required for a complete and finished installation. All of the threaded rod used for the tray support shall be 3/8" diameter for 12" wide tray and 1/2" minimum for tray larger than 12" wide. Bolts and nuts shall be installed in all holes of the cable tray splice plates per the manufacturers instructions for installation. Tray support shall be installed in a trapeze, wall angle, or center support configuration as shown on the plans, outlined in the spec and approved by the project engineer. Center support is allowed on 12” wide and less cable tray.

D. The maximum allowable deviation of the tray, from the level horizontal plane measured across the width of the tray, is one half of one inch (1/2"), with the tray loaded to capacity, as allowed by the NEC.

E. Use manufactured expansion fittings where required at the building expansion joints and as required by the manufacturer. Nuts, bolts, washers, rod, etc. shall be plated. Ground and bond cable tray. Provide continuity between tray components. Use anti-oxidant compound to prepare aluminum contact surfaces before assembly if required by the manufacturer.

F. Provide #4 AWG bare stranded copper equipment grounding conductor through entire length of tray. Bond equipment ground conductor to each component, each tray section, and connect to the main building equipment grounding conductor. Equipment grounding conductor is not required in telecommunications applications provided that the tray is U.L. Listed for grounding. Bond cable tray to the telecommunication grounding bar or conductor in each equipment room (#4 AWG minimum). Equipment grounding conductor connections to the tray shall be made using a U.L. listed mechanical connection. Sheet metal or TEK screws shall not be used for grounding.

G. All single and multi-conductor cables shall be fastened to the tray at intervals not to exceed four feet (4').

H. Conduit connections to the tray shall be made with an U.L. approved clamp, manufactured specifically for the purpose.

I. Do not install cable tray below re-heat coils, traps, etc. In those areas that have no option furnish and install a cover 12” on either side.

J. Where cable tray is to penetrate a fire rated wall or floor, this contractor shall use the following installation method:
   1. Stop the tray at the penetration and fasten the tray end to the wall/floor.
   2. For every 6" of tray width , furnish and install a 4" rigid galvanized nipple, threaded at both ends, through the penetration extending 4" beyond both sides and supported per section 26 05 29.
   3. Provide a fiber or plastic bushing on one end and ground bushing on other.
   4. Bond each grounding bushing to the equipment-grounding conductor with a minimum # 4 stranded copper wire using an U.L. listed connector.
   5. Completely seal around the conduits with an U.L. listed fire rated assembly appropriate for penetration.
   6. Completely seal the conduits that have conductors and cables passing through, with a U.L. approved fire rated sealant.
   7. Close off the unused conduits with a 14 Ga. steel penny held in place by the above-required bushings.
   8. The Contractor can run cable tray through fire rated wall or floor provided opening is sealed with fire putty and/or pillows according to manufacturers recommendations. The entire assembly must be UL approved and meet fire code requirement.

3.3. CONDUIT

A. See CONDUIT INSTALLATION SCHEDULE below for other limitations for EMT and other types of conduit.

B. Size power conductor raceways for conductor type installed. Conduit size shall be 3/4-inch (19 mm) minimum except as specified elsewhere. Caution: Per the NEC, the allowable conductor ampacity is reduced when more than three current-carrying conductors are installed in a raceway. Contractor must take the NEC ampacity adjustment factors into account when sizing the raceway and wiring system.

C. Size conduit for all other wiring, including but not limited to data, control, security, fire alarm, telecommunications, signal, video, etc. shall be sized per number of conductors pulled and their cross-section. 40% fill shall be maximum for all new conduit fills.

D. Arrange conduit to maintain headroom and present a neat appearance. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping. Maintain minimum 6-inch (150 mm) clearance between conduit and piping. Maintain 12-inch (300 mm) clearance between conduit and heat sources such as flues, steam pipes, and heating appliances. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized pipe straps, conduit racks (lay-in adjustable hangers), clevis hangers, or bolted split stamped galvanized hangers. Group conduit in parallel runs where practical and use conduit rack (lay-in adjustable hangers) constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit. Do not fasten conduit with wire or perforated pipe straps. Before conductors are pulled, remove all wire used for temporary conduit support during construction. Support and fasten metal conduit at a maximum of 8 feet (2.4 m) on center. Supports shall be independent of the installations of other trades, e.g. ceiling support wires, HVAC pipes, etc., unless so approved or detailed.

E. In general, all conduit shall be concealed except where noted on the drawings or approved by the Architect/Engineer. Contractor shall verify with Architect/Engineer all surface conduit installations except in mechanical rooms. Changes in direction shall be made with symmetrical bends, cast steel boxes, stamped metal boxes or cast steel conduit bodies. No continuous conduit run shall exceed 100 feet (30 meters) without a junction box. Install no more than the equivalent of three 90-degree bends between boxes.

F. Cut conduit square using a saw or pipecutter; de-burr cut ends. Conduit shall not be fastened to the corrugated metal roof deck. Bring conduit to the shoulder of fittings and couplings and fasten securely.

G. Use conduit hubs for fastening conduit to cast boxes. Use sealing locknuts or conduit hubs for fastening conduit to sheet metal boxes in damp or wet locations (sheet metal boxes 4 & 11/16th" square and larger, shall contain NO pre-punched or concentric knockouts).

H. All conduit terminations (except for terminations into conduit bodies) shall use connectors or conduit hubs with one locknut or shall use double locknuts (one each side of box wall) and insulating bushing. Provide bushings for the ends

of all conduit not terminated in box walls. Refer to Section 26 05 26 – Grounding and Bonding for Electrical Systems for grounding bushing requirements.

I. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2-inch (50 mm) size unless sweep elbows are required. Conduit shall be bent according to manufacturers recommendations. Torches or open flame shall not be used to aid in bend of PVC conduit.

J. Use suitable conduit caps or other approved seals to protect installed conduit against entrance of dirt and moisture. Provide 1/8-inch (3 mm) nylon pull string in empty conduit, except sleeves and nipples.

K. Install expansion-deflection joints where conduit crosses building expansion joints. Note: expansion-deflection joints are not required where conduit crosses building control joints if the control joint does not act as an expansion joint. Install expansion fitting in PVC conduit runs as recommended by the manufacturer.

L. Avoid moisture traps where possible. Where moisture traps are unavoidable, provide junction boxes with drain fittings at conduit low points.

M. Where conduit passes between areas of differing temperatures such as into or out of cool rooms, freezers, unheated and heated spaces, buildings, etc., provide Listed conduit seals to prevent the passage of moisture and water vapor through the conduit.

N. Route conduit through roof openings for piping and ductwork where possible.

O. Ground and bond conduit.

P. PVC conduit shall transition to galvanized rigid metal conduit before it enters a concrete pole base, foundation, wall (where exposed) or up through a concrete floor. Use PVC-coated rigid steel factory elbows for bends in plastic conduit larger than 2". PVC elbows are allowed in PVC conduit runs 2" and smaller. PVC conduit shall be cleaned with solvent, and dried before application of glue. The temperature rating of glue/cement shall match weather condition. Apply full even coat of cement/glue to entire area that will be inserted into fitting. The entire installation shall meet manufacturers recommendations.

Q. All conduit installed underground (exterior to building) shall be buried a minimum of 24" below finished grade, whether or not the conduit is concrete encased.

R. Medium voltage conduit may be installed in interior locations other than electrical vaults only with special permission from Architect/Engineer.

S. CONDUIT INSTALLATION SCHEDULE:
   1. Conduit other than that specified below for specific applications shall not be used.
   2. Equipment Connection: flexible conduit; Use liquidtight flexible conduit in damp or wet locations.
   3. Underground Installations Within Five Feet (1.5 m) of Foundation Wall: Rigid steel conduit.
   4. Underground Installations More than Five Feet (1.5 m) From Foundation Wall: Rigid steel conduit. Plastic-coated rigid steel conduit. Schedule 40 PVC conduit.
   5. Under Slab on Grade Installations: Schedule 40 PVC conduit.
   6. Exposed Outdoor Locations: Rigid steel conduit.
   7. Concealed in Concrete and Block Walls: Rigid steel conduit. Schedule 40 PVC conduit. Electrical metallic tubing. Schedule 40 PVC conduit. Electrical Nonmetallic Tubing (ENT).
   8. Within Concrete Slab: Rigid steel conduit. Schedule 40 PVC conduit. Electrical Nonmetallic Tubing (ENT).
   9. Wet Interior Locations: PVC coated rigid steel conduit. Schedule 40 PVC conduit to be used in corrosive atmospheres only!
   10. Concealed Dry Interior Locations: Rigid steel conduit. Intermediate metal conduit. Electrical metallic tubing.
   11. Exposed Dry Interior Locations: Rigid steel conduit. Intermediate metal conduit. Electrical metallic tubing.

12. Motor and equipment connections: Flexible PVC coated metal conduit (wet, damp, or dry locations). Flexible metal conduit (dry locations only). Minimum length shall be one foot (300 mm), maximum length shall be three feet (900 mm). Conduit must be installed perpendicular to direction of equipment vibration to allow conduit to freely flex.
13. Light fixtures: Direct box or conduit connection for surface mounted and recessed fixtures. Flexible metal conduit from a J-box for recessed lay-in light fixtures. Conduit size shall be 1/2" (12 mm) minimum diameter and six foot (1.8 M) maximum length. Conduit length shall allow movement of fixture by 3 feet for maintenance purposes.
14. Medium Voltage Applications (Interior Locations): Rigid steel conduit.
15. Low-voltage, signal wiring: Schedule 40 PVC conduit. Conduit size shall be 1/2" (12 mm) minimum diameter and not be filled above 50%. Conduit is not required on last 12" to device if flexibility is required. Plenum-rated cable may be acceptable upon approval by owner.

3.4. SURFACE RACEWAY AND MULTI-OUTLET ASSEMBLY

A. METAL:
1. Use flat-head screws to fasten channel to surfaces every twenty-four (24) inches. Mount plumb and level.
2. Use suitable insulating bushings and inserts at connections to outlets and corner fittings.
3. Maintain grounding continuity between raceway components to provide a continuous grounding path.
4. Fastener Option: Use clips and straps suitable for the purpose.

B. NONMETAL:
1. Use flat-headed screws with appropriate anchors to fasten channel to surfaces secured every twenty-four (24) inches. Mount plumb and level. All surface mounted devices shall be fastened to the wall utilizing flat head screws along with appropriate anchors. No device shall be adhered to the wall surface using two-faced tape or any means other than as described above.
2. Use suitable insulating bushings and inserts at connections to outlets and corner fittings.
3. In areas where the walls cannot be fished, the station cable serving these outlets shall be covered with raceways. No exposed wire shall be permitted within offices, laboratories, and conference rooms or like facilities.
4. The non-metallic raceway shall have a screw-applied base. Both the base and cover shall be manufactured of rigid PVC materials.
5. The raceway shall originate from a surface mounted box mounted adjacent to and at the same height as existing electrical boxes in the room, be attached to the wall and terminate above the ceiling.
6. All fittings including, but not limited to, extension boxes, elbows, tees, fixture bodies shall match the color of the raceway.
7. The raceway and all systems devices shall be UL listed and exhibit nonflammable self-extinguishing characteristics, tested to specifications of UL94V-0.
8. The raceway and all systems devices shall adhere to the EIA/TIA Category 5e bend radius standard.

3.5. AUXILIARY GUTTERS (Wireways)

A. Bolt auxiliary gutter to wall using two-piece hangers or steel channels fastened to the wall or in self-supporting structure.

B. Gasket each joint in oil-tight gutter.

C. Mount rain-tight gutter in horizontal position only.

D. Maintain grounding continuity between raceway components to provide a continuous grounding path.

3.6. BOXES

A. COORDINATION OF BOX LOCATIONS:
1. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.
2. Electrical box locations shown on Contract Drawings are approximate unless dimensioned. Verify location of floor boxes and outlets in offices and work areas prior to rough-in.
3. No outlet shall be located where it will be obstructed by other equipment, piping, lockers, benches, counters, etc.
4. Boxes shall not be fastened to the metal roof deck.

5. It shall be the Contractor's responsibility to study drawings pertaining to other trades, to discuss location of outlets with workmen installing other piping and equipment and to fit all electrical outlets to job conditions.
6. In case of any question or argument over the location of an outlet, the Contractor shall refer the matter to the Architect/Engineer and install outlet as instructed by the Architect/Engineer.
7. The proper location of each outlet is considered a part of this contract and no additional compensation will be paid to the Contractor for moving outlets, which were improperly located.
8. Locate and install boxes to allow access to them. Where installation is inaccessible, coordinate locations and provide 18 inch (450 mm) by 24-inch (600 mm) access doors.
9. Locate and install to maintain headroom and to present a neat appearance.
10. Install boxes to preserve fire resistance rating of partitions and other elements, using approved materials and methods.

B. OUTLET BOX INSTALLATION:
1. Do not install boxes back-to-back in walls. Provide minimum 6-inch (150 mm) separation, except provide minimum 24-inch (600 mm) separation in acoustic-rated walls.
2. Power: Recessed (1/4" maximum) outlet boxes in masonry, concrete or tile construction shall be masonry type, minimum 4-inch square. Device covers shall be square-cut except rounded corner plaster rings are allowed in drywall applications. Angle cut plaster rings are not permitted. Coordinate masonry cutting to achieve neat openings for boxes.
3. Low Voltage: Recessed (1/4" maximum) outlet boxes in masonry, concrete or tile construction shall be masonry type, minimum 4 11/16 inch square. Device covers shall be square-cut except rounded corner plaster rings are allowed in drywall applications. Angle cut plaster rings are not permitted. Coordinate masonry cutting to achieve neat openings for boxes.
4. Provide knockout closures for unused openings.
5. Support boxes independently of conduit except for cast boxes that are connected to two rigid metal conduits, both supported within 12 inches (300 mm) of box.
6. Use multiple-gang boxes where more than one device are mounted together; do not use sectional boxes. Provide non-metallic barriers to separate wiring of different voltage systems.
7. Install boxes in walls without damaging wall insulation.
8. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
9. Ceiling outlets shall be 4-inch (100 mm) octagon or 4-inch square, minimum 2-1/8 inch (54 mm) deep except that concrete boxes and plates will be approved where applicable. Position outlets to locate luminaires as shown on reflected ceiling plans. All ceiling outlets shall be equipped with 3/8-inch (10 mm) fixture studs.
10. In inaccessible ceiling areas, position outlets and junction boxes within 6 inches (150 mm) of recessed luminaire, to be accessible through luminaire ceiling opening.
11. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.
12. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.
13. Provide cast ferroalloy or aluminum outlet boxes in exterior and wet locations.
14. Surface wall outlets shall be 4-inch (100 mm) square with raised covers for one and two gang requirements. For three gang or larger requirements, use gang boxes with non-overlapping covers.

C. FLOOR BOX INSTALLATION:
1. Set boxes level and flush with finish flooring material.

D. PULL AND JUNCTION BOX INSTALLATION:
1. Locate pull boxes and junction boxes above accessible ceilings, in unfinished areas or furnish and install approved access panels in non-accessible ceilings where boxes are installed.
2. Support pull and junction boxes independent of conduit.

3.7. UNDERGROUND DUCT

A. Excavations:
1. Excavate trenches for ductbank to adequate width, depth, and proper slope as specified.
2. Install forms on sides of ductbank if trench is not of proper firmness to prevent cave-in.

3. Bottom of trench shall be undisturbed earth. If trench bottom is too low for proper grade, fill to proper level with sand and mechanically compact it.
4. Each excavated section from manhole to manhole and from manhole to building shall be completely excavated and graded before any duct is laid in that section.

B. Placement of Conduit:
1. Within five (5) feet of each building wall or manhole wall penetration, install heavy wall galvanized steel conduit within the concrete envelope to provide protection against vertical shearing. This requirement is waived if the reinforcing steel in the ductbank is poured or doweled into the wall to provide protection against vertical shearing.
2. When entering an existing building or manhole, core drill existing walls and waterproof using a mechanical seal of assembled rubber links properly sized for the pipe and tighten in place, in accordance with the manufacturer's instruction, after the new conduit is installed.
3. Install flush bell ends on duct at manholes and buildings. When entering a new building or a new manhole, a pre-manufacture end bell system (by Formex or similar) with conduit seals is allowed.
4. Install spacers as recommended by conduit manufacturer and requirements stated above, but not to exceed a maximum of 6 ft-0 in. on center for PVC conduit and 8 ft-0 in. on center for steel conduit. Bottom spacers shall rest on 8" X 16" X 2" minimum concrete pads to prevent them from sinking into the ground and reducing the bottom concrete cover. Stagger conduit joints in concrete encasement 6 in. minimum horizontally.
5. Pitch conduit properly for drainage to manhole or pull box and to prevent low pockets or irregular dips between conduit ends. Minimum pitch to be 4 in. per 100 ft.
6. Install not more than one 90-degree bend or equivalent between pull points for primary conduit and two 90-degree bends or equivalent for signal conduit.
7. In ductbanks with both primary and signal conduit, primary conduit shall be straight and the signal conduit shall contain bends as necessary to accommodate the primary duct.
8. Install insulated grounding bushings on steel duct ends.
9. Install pull tape with measurement markings in each empty duct.
10. Install closure plugs or caps on empty conduits at building entrances and at terminations in equipment pedestals to prevent the entrance of moisture and gases.

C. Placement of Reinforcing Bars:
1. Install the bars - one in each corner minimum, overlap the joints 12" and tie into the connecting walls of manholes, vaults, and buildings, etc.
2. At new building and manhole walls, tie duct and manhole reinforcing steel together to provide a permanent connection.
3. At existing building and manhole walls, dowel reinforcement bar into the wall to provide protection against vertical shearing.

D. Placement of Concrete:
1. After ducts are in place and before the concrete is poured, the installation shall be inspected by the CITY Construction Representative. Notify the Construction Representative at least two days before the time of inspection.
2. The Contractor shall supervise the placement of concrete in the ductbank.
3. Complete entire section of conduit from manhole to manhole or from manhole to building before encasement by concrete.
4. Top of concrete envelopes shall be not less than 24 inches below grade.
5. In placing concrete around the conduit, adjust delivery chute so the fall of the concrete into the trench is minimal.
6. Provide minimum of 3" (76 mm) of concrete cover over conduit at the top, bottom and sides of the duct bank. Provide troweled crowned top on the concrete to prevent water accumulation.
7. Place concrete continuously from manhole to manhole to building without interruption.
8. Extend concrete envelope to finish floor grade or interior wall surface in buildings and finish pad grade at equipment. Maintain moisture seal.

E. Backfill
1. Install underground warning tape 12" below finish grade over all ductbanks. Tape shall be red with the words "CAUTION-Buried Electric Line Below" as manufactured by Seton or similar.

2. Compact backfill around ductbank.
3. After completion of ductbank installation, return all ground and pavement surfaces to original condition or to condition as indicated on the drawings. This includes all sidewalks, curbs, streets, parking areas, lawns, shrubs, etc.

F. Accessory Installation
1. Pull a mandrel/swab (diameter 1/4 in. smaller than conduit) through each conduit in completed ductbank to insure adequate opening of duct run.
2. Install pull tape in each empty duct.
3. Install closure plugs or caps on empty conduits at building entrances and at terminations in equipment pedestals to prevent the entrance of moisture and gases.
4. Ground all steel bushings to manhole or junction box ground.

3.8. WIRING

A. Low voltage control and signal cables shall be installed in separate conduit. However, they may be installed without conduit above accessible ceilings if the cable meets NEC requirements for the application, unless specified to be in conduit in other sections of the specifications. See requirements for free-air cabling installation below.

B. Do not use wire smaller than 14 AWG for control wiring greater than 60 volts, or #18 AWG for voltages less than 60 volts, all sizes subject to NEC 725 requirements.

C. Splice only in junction boxes. Mechanical connections shall be accessible for inspection and checking. No insulation shall be installed over mechanical ground connections.

D. All exposed wire and cable shall be installed in conduit if code requires.

E. Do not use wire smaller than 12 AWG for power and lighting circuits.

F. All conductors shall be sized to prevent excessive voltage drop at rated circuit ampacity. As a minimum use 10 AWG conductor for 20 ampere, 120-volt branch circuit home runs longer than 100 feet (30 m), and for 20 ampere, 277-volt branch circuit home runs longer than 200 feet (61 m). No conductor less than 10 AWG shall be installed in exterior underground conduit.

G. Make conductor lengths for parallel conductors equal.

H. Neatly train and lace wiring inside boxes, and equipment.

I. Ground connection surfaces shall be cleaned and all connections shall be made so that it is impossible to move them. Attach grounds permanently before permanent building service is energized. All grounding electrode conductors shall be installed in PVC conduit or rigid galvanized steel conduit bonded at both ends to the grounding electrode conductor with an approved grounding fitting.

J. Pull all conductors into a raceway at the same time. Use Listed wire pulling lubricant for pulling conditions when necessary. Use Listed wire pulling lubricant for pulling 4 AWG and larger wires and for other conditions when necessary.

K. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.

L. Completely and thoroughly swab raceway system before installing conductors.

M. Place all conductors of a given circuit (this includes phase wires, neutral (if any), and ground conductor) in the same raceway. If parallel phase and/or neutral wires are used, then place an equal number of phase and neutral conductors in same raceway or cable.

N. FREE AIR WIRING:

1. Low voltage control or signal cables may be installed 'Free-Air' (exposed cabling) if specifically noted on the drawings for each occurrence.
2. When permitted in exposed ceiling areas, 'Free-Air' wiring runs shall avoid areas of high traffic (i.e. aisle way), shall be run as close as possible to outlining walls and shall be a minimum of ten (10) feet above finished floor.
3. Cabling shall be neatly run at right angles and be kept clear of other trades work. Cabling shall be supported at a maximum of 4-foot intervals utilizing 'bridal-type' mounting rings anchored to ceiling concrete, piping supports or structural steel beams. If cable sag at mid-span exceeds 12-inches, another support shall be provided. Mounting rings shall be designed to maintain cables bend to larger than the minimum bed radius (typically 4 x cable diameter). Cabling shall not be attached to or supported by existing cabling, plumbing or steam piping, ductwork, suspended ceiling supports or electrical conduit. Additionally, cabling shall not be laid directly on the ceiling grid.
4. To reduce or eliminate Electro-Magnetic Interference (EMI), the following minimum separation distances for 'Free-Air' cabling installations shall be adhered to:
    a) Twelve (12) inches from power lines of less than 5kV.
    b) Thirty-nine (39) inches from power lines of 5kV or greater.
    c) Eighteen (18) inches from lighting fixtures.
    d) Thirty-nine (39) inches from transformers and motors.
5. A coil of 2 feet in each cable shall be placed in the ceiling at each 'free-air' wired device. These coils shall be secured (wire tied) at the last cable support before the cable reaches the device and shall be coiled from 100% to 200% of the cable recommended minimum bend radius.
6. All cable shall be free of tension at both ends. Nylon strain relief connectors shall be provided at each device and junction box where cables enter. In cases where the cable must bear some stress, Kellum type grips may be used to spread the strain over a longer length of cable. Cable manufacturers minimum bend radius shall be observed in all instances. Care should be taken in the use of cable ties to secure and anchor the station cabling. Ties should not be over tightened as to compress the cable jacket. No sharp burrs should remain where excess length of the cable tie has been cut.
7. All exposed vertical cable extensions to devices located below the finished ceiling shall be in conduit. Provide protection for exposed cables where subject to damage.
8. Control cables for controlling HVAC and lighting equipment connected to emergency power shall be routed in raceway.
9. Use suitable cable fittings and connectors.

O. TESTING:
1. Visual and Mechanical Inspections:
    a) Inspect exposed sections for physical damage.
    b) Verify cable is supplied and connected in accordance with single line diagram.
    c) Inspect for shield grounding, cable support and termination for tightness and proper installation.
    d) If cables are terminated through window type C.T.'s make an inspection to verify that neutrals and grounds are properly terminated for normal operation of protective devices.
    e) Inspect for visual jacket and insulation condition.
    f) Visible cable bends shall be checked against ICEA or manufacturer's minimum allowable bending radii -- 12 times the diameter for tape-shielded cables.
    g) Inspect for proper fireproofing in common cable areas.
    h) There shall be NO tests performed on existing cable without specific direction from the Consulting Engineer.
2. Electrical Tests:
    a) All secondary cables from the substation transformers to the secondary switchboards shall be subjected to insulation tests using a 500-vdc megger.
    b) Visually inspect cables, lugs, connectors and all other components for physical damage and proper connections
    c) Check all cable connectors for tightness (with a torque wrench) and clearances. Torque test conductor and bus terminations to manufacturer's recommendations.
    d) Check for proper grounding resistance at all services and at transformers. Resistance shall be 2 ohms maximum.
3. Additional testing as follows shall be performed if aluminum conductors are used:
    a) Equipment terminated with aluminum conductors shall be tested with a thermal imager and recorded.

b) Conductors shall be closely checked for loose or poor connections, and for signs of overheating or corrosion.
c) Test procedures shall meet NETA guidelines.
d) Test results and report shall be provided to the engineer.
e) Contractor shall correct all deficiencies reported in the test report.
f) Inspect grounding and bonding system conductors and connections for tightness and proper installation.

P. MODULAR WIRING SYSTEM INSTALLATION:
1. Install modular wiring system in accordance with manufacturer's instructions.
2. Provide separate support system for modular wiring systems. DO NOT SUPPORT MODULE WIRING FROM OTHER EQUIPMENT'S SUPPORT SYSTEM.

Q. BRANCH CIRCUITS:
1. The use of multi-wire branch circuits with a common neutral feeding loads is not permitted.
2. All branch circuits shall be furnished and installed with an individual accompanying neutral, sized the same as the phase conductor.

R. EMERGENCY CIRCUITS:
1. All emergency system wiring shall be installed in raceways separate from all other systems.

3.9. EQUIPMENT WIRING SYSTEMS

A. HVAC, MOTOR AND PLUMBING CONNECTIONS:
1. Provide all power wiring including all circuitry carrying electrical energy from panelboard or other source through starters, variable frequency drives (VFDs), and disconnects to motors or to packaged control panels. Packaged control panels may include disconnects and starters and overcurrent protection. Provide all wiring between packaged control panels and motors.
2. VFD Installations: Install VFD input wiring and output wiring in separate conduit systems. Do not mix VFD input power and output power, or control wiring in a common raceway.
3. Each motor terminal box shall be connected with a minimum 12", maximum 36" piece of flexible conduit to a fixed junction box. Use liquidtight flexible metal conduit for connections in damp or wet locations. Conduit must be installed perpendicular to direction of equipment vibration to allow conduit to freely flex.
4. Check for proper rotation of each motor.

B. COOLER AND FREEZER WIRING:
1. Provide rigid conduit, IMC or PVC for all surface wiring in coolers and freezers. Whenever possible avoid the use of surface wiring and run conduit in space behind or above insulated panels.
2. Provide non-metallic nipple and sealing fittings whenever conduit pierces wall of cooler or freezer. Provide grounding conductor.
3. All openings cut in walls of cooler or freezer shall be patched and insulation integrity shall be maintained. Patching shall be approved by freezer or cooler installer.
4. Install all wiring for lighting, switches, evaporator, coil fans, compressors, interlocks, defrost heaters, door heaters, drain heaters, alarms, or any other electric devices supplied with unit.

C. KITCHEN EQUIPMENT CONNECTIONS:
1. Check loose equipment delivered to job by equipment installer against approved shop drawings or other required Drawings. Loose electrical equipment including disconnects, starters, thermostats, controls, local and remote switches shall be furnished by equipment contractor and installed by electrical contractor.
2. Equipment contractor will receive all equipment and position in place.
3. Equipment contractor shall provide dimensioned equipment layouts, detailed shop drawings of equipment showing locations and method of installing loose equipment and making final connections, and wiring and control diagrams.
4. Electrical Contractor shall rough in for kitchen equipment only from approved kitchen equipment shop drawings.
5. Rough in location shall be within three inches of equipment. If direct connection is required, use liquidtight flexible conduit. If receptacle connection is required, verify proper receptacle configuration with equipment installer.

6. Final connections shall include extension of all service to each piece of equipment. All labor and material required to completely connect the equipment ready to operate shall be included in the final connections. All control wiring not integral with equipment shall be included.
7. Equipment contractor shall provide services of their representatives and or equipment manufacturer's representative at appropriate stage of construction to answer the Contractor's questions concerning the final connections.
8. For kitchen exhaust hoods provide all required power and control wiring. This may include (but is not limited to) the following:
    a. Provide switch in hood and branch circuit for integral light fixtures.
    b. Provide pushbutton switch or manual starter for exhaust fan.
    c. Provide emergency branch circuit for fire suppression system. Wire automatic heat detectors or manual station so, when activated, valve of dry chemical bottle opens, gas solenoid valve shuts down, all dampers close, exhaust and make-up fans shut down, electrical power contactor opens (integral in equipment), and building fire alarm system is activated. Provide all required wiring conduit and final connections. Refer to wiring diagrams supplied with equipment.
    d. Wire washdown system; refer to schematic wiring diagrams supplied with hoods. Interconnect fire prevention system with washdown system so washdown system is activated upon alarm.

3.10. MEDIUM VOLTAGE CABLES

A. FIREPROOFING:
1. Exposed cables in manholes, vaults, and cable trays shall be fireproofed. Additionally, cables shall be fireproofed in pull boxes, troughs, switchgear pull sections, bases, and pulling pits containing two or more sets of cable. Entire installation shall conform to manufacturer's recommendations.
2. Arc proofing material shall be Scotch #77 electrical arc and fireproofing tape, or approved equal.
3. Install the fireproofing on the cables as follows:
4. Install tightly applied fireproofing tape, approximately 1/16 inch thick by 1-1/2 inches wide minimum, around each feeder spirally in one half-lapped wrapping.
5. Install the tape with the coated side towards the cable and extend it not less than one inch into each duct.
6. Install random wrappings of Scotch #69 glass cloth tape around the installed fire proofing tape per manufacturer's instructions to prevent it from unraveling.

B. ACCEPTANCE TESTS:
1. Acceptance tests will be performed by an independent testing consultant under separate contract with the city. The Contractor shall coordinate the scheduling of the tests and provide labor and services necessary to allow the Testing Consultant to test each completed cable circuit. This includes opening and closing equipment, providing temporary light and power as needed, etc.
2. Acceptance tests will be performed on all cable after installation and prior to energization. All splices and terminations are to be completed and tested as part of the acceptance test.
3. In the event that test results are not satisfactory, the Contractor shall make repairs and replace components as necessary to correct faults. Following corrections, tests will be repeated to the extent required to prove the deficiencies are corrected.

3.11. CABLE PULLING

A. Pump all water out of the manholes prior to beginning work.

B. Prior to pulling cable, a mandrel/swab 1/4 inch smaller than the duct diameter shall be pulled through duct run to insure adequate opening of duct run. Thoroughly swab conduits to remove foreign material before pulling cables.

C. Cables shall not be pulled from an outdoor (exterior) location when the outdoor (exterior) air temperature is below 40° F.

D. Contractor shall furnish all required installation tools to facilitate cable pulling without damage to the cable jacket. Such equipment is to include, but be not limited to, sheaves, winches, cable reels and/or cable reel jacks, duct entrance funnels, pulling tension gauge, and similar devices. All equipment shall be of substantial construction to allow steady progress once pulling has begun. Makeshift devices, which may move or wear in a manner to pose a hazard to the

cable shall not be used. Cable ends shall be sealed and firmly held in the pulling device during the pulling operation. Cable pulling shall be done in accordance with cable manufacturer's recommendations, except as modified herein, and ANSI/IEEE C2 standards. Manufacturer's recommendations shall be a part of the cable submittal. Recommended pulling tensions shall not be exceeded. Pulling bending radius shall not be less than that determined by the manufacturer or the NEC. Restrictions of pulling bending radius dimensions shall be strictly observed. Training bending radius shall not be less than 12 times cable diameter. Any cable bent or kinked to radius less than recommended dimension shall not be installed. Actual pulling tensions shall be continuously monitored and permanently recorded in a log and submitted to the Engineer at the end of the project.

E. During pulling operation an adequate number of persons shall be present to allow cable observation at all points of duct entry and exit as well as to feed cable and operate pulling machinery. Pulling lubricant shall be used to ease pulling tensions. Lubricant shall be of a type, which is noninjurious to the cable material used. Lubricant shall not harden or become adhesive with age. Avoid abrasion and other damage to cables during installation.

F. Where cables are left in manhole or switchgear overnight or more than 8 hours prior to termination, the cable ends shall be sealed with paraffin or shrink wrap caps and supported in a manner which will prevent entrance of moisture into the cable. Cable shall be terminated and energized as soon as possible.

G. CABLE ROUTING IN MANHOLES AND SWITCHGEAR:
   1. Certain manholes, as indicated on the drawings, shall have the cable looped around the walls. In such cases, the cable shall circle the manhole at least 360 degrees. Where manholes are not to be looped, cable shall be routed on the walls with the longest distance between points of entry and exit. Arrange cables to avoid interference with duct entrances into manhole.
   2. All new and existing cable in manholes shall be secured to racks on the manhole walls. Cables shall be secured to racks with split porcelain insulators and clamps or mounted on a heavy-duty nonmetallic multi-mount cable support arm as manufactured by Underground Devices, Inc.. Insulators shall be of adequate size to contain all three phases and the ground of a given circuit. Fastening cables directly to support channel with wire or plastic ties will not be accepted.
   3. 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 grounded metal or which compresses cable diameter. Cable training bending radius shall be at least 12 times cable diameter. Any cable bent to a radius less than recommended dimension will not be accepted.
   4. Jumper cable shall be routed in a manner that maintains adequate through-air clearance between adjacent conductors and between conductors and any metallic or grounded surface.

H. SPLICES AND TERMINATIONS INSTALLATION:
   1. Splices are to be held to a minimum. Splice locations shall be determined by cable lengths available, pulling conditions and termination points. Splice locations are to be listed by the Contractor prior to cable purchase and a listing of such locations submitted to the Engineer for approval before final cable lengths are determined.
   2. Only experienced electricians shall be employed in this phase of the work. Follow cable manufacturer's and splice or termination manufacturer's installation instructions and ANSI/IEEE C2 standards.
   3. Clean, white lint-free gloves shall be used to handle end of cable during tape wrapping procedures.
   4. Termination or splicing of the copper conductors (both power and ground conductors) shall be made only with tool applied compression (swaged) fittings. Thoroughly clean wires before installing lugs and connectors.
   5. Wire splices and taps shall be made firm, and adequate to carry the full current rating of the respective wire without soldering and without perceptible temperature rise.
   6. All splices shall be so made that they have an electrical resistance not in excess of two feet (600 mm) of the conductor.
   7. Use solderless spring type pressure connectors with insulating covers for wire splices and taps, 10 AWG and smaller.
   8. Use mechanical or compression connectors for wire splices and taps, 8 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of the insulation value of conductor.
   9. Thoroughly clean wires before installing lugs and connectors.

10. Splice or termination failure upon high potential acceptance test will require complete reconstruction of the joint to manufacturer's specifications. Make sure that there is enough free cable at each termination or splice for two more terminations or splices to be performed.
11. Install Scotch #70 tape for anti-tracking on all exposed terminations.
12. All splices and terminations are to be tagged using embossed plastic tags with plastic attachment devices indicating date splice or termination was made, name of electrician involved, name of Contractor installing cable, feeder number and circuit to and from data.
13. All cable splices in manholes shall be supported on both sides of the splice within 2'0" of the splice. Splices shall not rely on cable for support.
14. Lugs shall be bolted to termination pads in equipment using corrosion resistant bolts, nuts, and washers. Use Belleville washers for bolting aluminum to aluminum, and lock washers for bolting copper to copper or as recommended by equipment manufacturer. Washers shall be in the lug side. Torque to manufacturer's recommendations.
15. Splice only in accessible junction boxes.
16. All splices shall be so made that they have an electrical resistance not in excess of two feet (600 mm) of the conductor.
17. At all splices and terminations, leave tails long enough to cut splice out and completely re-splice.
18. Ground system connections:
19. Cable to bus: compression cable fitting bolted to bus with lock washers under nut.
20. Cable to ground rod: approved bolted fitting with backing plate between cable and rod.
21. Ground cable shield at each termination and splice.

I. LABELING

1. All labels shall be permanent, and machine generated. NO HANDWRITTEN OR NON-PERMANENT LABELS ARE ALLOWED.
2. Label size shall be appropriate for the conductor or cable size(s), outlet faceplate layout and patch panel design. All labels shall be self-laminating, white/transparent vinyl and be wrapped around the cable or sheath. Flag type labels are not allowed. The labels shall be of adequate size to accommodate the circumference of the cable being labeled and properly self-laminate over the full extent of the printed area of the label.
3. Nameplates: Engraved three-layer laminated plastic, black letters on a white background. Emergency system shall use white letters on red background.
4. Tape (phase identification only): Scotch #35 tape in appropriate colors for system voltage and phase.
5. Adhesive type labels not permitted except for phase and wire identification.
6. Provide the following information on cable identification label:
   a) Main feeder circuit breaker number
   b) Phase
   c) To and From Data

      a. EXAMPLE:
      b. FDR C.B.: 1
      c. TO: CITY COUNTY BUILDING
      d. FROM: MUNICIPAL BUILDING

J. Install cable labels on each conductor at each cable termination, each cable splice, in each manhole and in each pullbox. Additionally, at these locations, provide one inch (1") colored vinyl plastic electrical tape wrap identification, (Scotch 35 or approved equal) around each conductor and cable as follows:

K. 5 KV individual conductor system

1. A - phase - one (1) yellow wrap
2. B - phase - two (2) yellow wraps with 1/2" space between wraps
3. C - phase - three (3) yellow wraps with 1/2" space between wraps

L. 15 KV individual conductor system

1. A - phase - one (1) red wrap
2. B - phase - two (2) red wraps with 1/2" space between wraps

3. C - phase - three (3) red wraps with 1/2" space between wraps

M. During entire cable installation, phasing of conductors shall be maintained and identified. Where final connections to equipment are made, phasing shall be verified and proper phase rotation determined prior to connection.

3.13. INSTALLATION HANGERS AND SUPPORTS

A. Fasten hanger rods, conduit clamps, outlet, junction and pull boxes to building structure using pre-cast insert system, preset inserts, beam clamps, expansion anchors, or spring steel clips (interior metal stud walls only).

B. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchors on concrete surfaces; sheet metal screws in sheet metal studs and wood screws in wood construction.

C. Do not use powder-actuated or plastic anchors. File and de-bur cut ends of support channel and spray paint with cold galvanized paint to prevent rusting. Do not fasten supports to piping, ductwork, mechanical equipment, cable tray or conduit. Do not drill structural steel members unless approved by City. Fabricate supports from galvanized structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.

D. In wet locations, mechanical rooms and electrical rooms install free-standing electrical equipment on 3.5 inch (89 mm) concrete pads.

E. Install surface-mounted cabinets and panelboards with minimum of four anchors. Provide steel channel supports to stand cabinet one inch (25 mm) off wall.

F. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.

G. Furnish and install all supports as required to fasten all electrical components required for the project, including free standing supports required for those items remotely mounted from the building structure, catwalks, walkways etc.

3.14. INSTALALTION WALLSWITCHES, RECEPTACLES, DEVICE PLATES AND COVERS, SERVICE FITTINGS, AND POKE THROUGH FITTINGS

A. Install wall switches 42 inches (1.06 m) o.c. above floor, OFF position down.

B. Install wall dimmers 42 inches (1.06 m) o.c. above floor; de-rate ganged dimmers as instructed by manufacturer; do not use common neutral.

C. Install convenience receptacles 18 inches (450 mm) o.c. above floor, 8 inches (200 mm) above backsplash, grounding pole on top.

D. Install box for telephone jack 18 (450 mm) o.c. above finished floor. Install box for telephone jack for wall telephone 48 (1.2 m) above finished floor.

E. Install specific-use receptacles at heights shown on Contract Drawings.

F. Drill opening for poke-through fitting installation in accordance with manufacturer's instructions.

G. Install decorative plates on switch, receptacle, and blank outlets in finished areas.

H. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.

I. Install devices and wall plates flush and level.

J. Receptacles shall have a bonding conductor from grounding terminal to the metal conduit system. Self-grounding receptacles using mounting screws as bonding means are not approved.

K. Verify that each receptacle device is energized. Test each receptacle device for proper polarity.

L. Test each GFCI receptacle device for proper operation.

M. The user agency and Owner personnel reserve the right to be present at all tests.

N. Adjust devices and wall plates to be flush and level.

O. Mark all conductors with the panel and circuit number serving the device with a machine generated label, at the device.

3.15.CONCRETE WORK

A. All equipment located on concrete floors inside the building or on grade outside the building, shall be mounted on a concrete base. The concrete base shall be four inches high and shall extend six inches beyond the edge of equipment base unless indicated otherwise on drawings.

B. Provide all layout drawings, anchor bolts, metal shapes, and/or templates required to be cast into concrete or used to form concrete for the support of electrical equipment.

3.16. ELECTRIC DEMOLITION

A. Remove, relocate, and extend existing installations to accommodate new construction.

B. Remove abandoned wiring to source of supply.

C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

D. Disconnect abandoned outlets, panelboards, luminaires, distribution equipment and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

E. Repair adjacent construction and finishes damaged during demolition and extension work.

F. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

G. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified. This includes the extension of the circuit from the last active device to the next device in the system to be activated.

H. All openings caused by removal of electrical equipment are to be patched with like material to match surroundings. Painting is not necessary unless noted otherwise.

I. Remove and cover bridged switches with removable plate similar to original switch.

J. All removed equipment including ballasts and lamps shall be properly disposed by contractor.

K. <u>PCB BALLAST HANDLING AND DISPOSAL</u>

1. Generally, all high power factor fluorescent light ballasts manufactured before 1978 and some HID ballasts contain PCB compounds in their capacitors. The Contractor shall inspect all ballasts in all light fixtures (which will become the property of the Contractor and will be removed from the project site as part of this project) and take the actions described below.

a. All ballasts labeled as "NON-PCBs" or "NO PCBs" shall be properly disposed by the Contractor. If the PCB content is not stated on the ballast label, the ballast shall be handled as a PCB ballast.

b. All PCB ballasts shall be removed from the light fixtures and shall have the wires clipped off. However, before removal, all PCB ballasts shall be carefully inspected for leaks. If a ballast appears to be leaking (evidenced by potting compound leaking out or by an oily film on the ballast surface) the ballast must be handled per EPA and DNR PCB regulations. Basically, this means the ballast is to be carefully removed from the fixture and placed in an approved drum. See paragraph below for the drum specifications. The person removing the ballast from the fixture shall wear protective gloves, eye protection, and protective clothing as necessary.

c. If the fixture has also been contaminated, it must be cleaned to less than 10 micrograms/100 square centimeters contamination before disposal. This cleaning must be done by an approved PCB contractor and is not considered a part of this contract. Contact City project manager for contractor approval before commencing with the cleanup.

d. The ballasts shall then be placed in US DOT approved type 17C or type 17H drums(barrels) furnished by the Contractor. 55 gallon and 30 gallon drums are available from most drum suppliers. The quantity and size of the drums will be determined by the Contractor at the time of construction.

e. These barrels shall be placed in storage with the cover that came with the barrels, in a location within a building, as designated by the Building Manager or Owner project representative. The barrels are not to be placed outside where they are exposed to weather.

f. The Contractor shall label and mark the PCB storage drums with EPA approved PCB labels and the storage area with signs, marks and lines to meet the regulations of Wisconsin Code NR 157.

g. The Contractor shall also provide approved PCB absorbent materials to be stored immediately adjacent to the drum storage area. Do not place loose absorbent material in the drums.

h. The Contractor shall provide to the Owner Project representative, in written form, a total count of these ballasts(or their total weight by barrel) and where they are stored.

i. When the ballast demolition is completed and all PCB ballasts are placed in drums ready to be picked up for disposal, the contractor will make arrangements for pickup and disposal of the PCB ballasts by a certified disposal company.

L. LAMP HANDLING AND DISPOSAL

1. All lamps (fluorescent, incandescent, and HID) contain mercury and/or lead (in the base) as well as other heavy metals and compounds which are regulated by the EPA and DNR during the disposal process. As a result, regulations have been issued covering the handling and disposal of all lamps. Therefore, lamps which have been removed from service for disposal shall be handled as follows by the Contractor.
2. The Contractor shall very carefully remove all lamps (fluorescent, incandescent, and HID) from light fixtures before removal of the fixture from its mounted position. This is to reduce the likelihood that the lamp(s) will be broken. If the Contractor breaks more than 1% of the total lamps removed for the project, the Contractor will be charged the cost difference between disposal of broken lamps and disposal of unbroken lamps for all lamps broken in excess of 1% of the total lamps removed in the project.
3. The Contractor shall provide containers large enough to fully conceal the removed lamps and appropriate for lamp transportation. Removed lamps shall be placed in containers provided by the Contractor and marked with the number and type of lamps. Containers shall be placed in storage in a location on the user agency's property (this may be in another building) arranged by the City field representative. The Contractor shall label the area as "Hazardous Material Storage - Mercury". Contractor will make arrangements for pickup and disposal of the lamps by a certified disposal company.

3.17. GENERAL INSPECTION AND CLEANING OF ALL ELECTRICAL EQUIPMENT

A. Inspect for physical damage and abnormal mechanical and electrical conditions. Any item found to be out of tolerance, or in any other way defective as a result of the required testing, shall be reported to the City. Procedure for repair and/or replacement will be outlined. After appropriate corrective action is completed the item shall be re-tested.

B. Compare equipment nameplate information with the latest single line diagram and report any discrepancies.

C. Verify proper auxiliary device operation and indicators.

D. Check tightness of accessible bolted electrical joints. Use torque wrench method. Inspect equipment anchorage. Inspect equipment and bus alignment.

E. Make a close examination of equipment and remove any shipping brackets, insulation, packing, etc. that may not have been removed during original installation.

F. Make a close examination of equipment and remove any dirt or other forms of debris that may have collected in existing equipment or in new equipment during installation.

G. Clean All Equipment:
   1. Vacuum inside of panelboards, switchboards, switchgear, transformer core and coils, horizontal and vertical busducts, MCC's, fire alarm panels, comm/data, security panel, etc.
   2. Loosen attached particles and vacuum them away.
   3. Wipe all insulators with a clean, dry, lint free rag.
   4. Clean insulator grooves.
   5. Re-vacuum inside surfaces as directed by the City Construction Representative or Inspector

H. Check all heater elements for operation and control.

I. Lubricate nonelectrical equipment per manufacturer's recommendations.

3.18. MEDIUM VOLTAGE AIR CIRCUIT BREAKERS AND CUBICLES

A. Inspect for physical damage and cleanliness. Inspect anchorage.

B. Mechanical operator tests shall be performed on both the breaker and its operating mechanism in accordance with the manufacturer's instructions.

C. Check the tightness of the bolted bus joints by calibrated torque wrench method. Refer to manufacturer's instructions for proper torque foot-pound levels.

D. Check the cell fit and the element alignment, including the circuit breaker and bus stabs.

E. Check the lowering and raising mechanism if the breaker is of this type, or the horizontal levering-in mechanism.

F. Verify the availability of all maintenance devices for servicing and operating the equipment.
   1. Check all heater elements for operation and control.
   2. Completely clean the interior of all cubicle sections including all bus work and insulators using the following methods:
   3. Loosen attached particles and vacuum them away.
   4. Wipe all porcelain with a clean, dry lint free rag.
   5. Clean insulator groves.
   6. Vacuum the inside of the switchgear and enclosure.

3.19. LOAD BREAK MEDIUM VOLTAGE SWITCHES (5 kV and above All-Duty Switches)

A. Check blade alignment and arc interrupter operation.

B. Check fuse linkage and element for proper holder and current rating. Check each fuse holder for adequate mechanical support of each fuse.

C. Verify interlocks and proper key distribution.

D. Verify proper phase barrier, materials and installation.

3.20. GROUNDING SYSTEMS

A. MEDIUM VOLTAGE SYSTEM GROUNDING:

1. Provide and install a ground bus 18" above finished floor with insulated standoffs 36” on center, completely around the perimeter of the room (vault) containing the high voltage switchgear and unit substation. Route bus over door. All connections to bus shall be bolted with Belleville washers and compression (tool applied) spade lugs or Exothermic.
2. Provide six [6] ground rods equally spaced around high voltage switchgear room. Connect to ground bus with 4/0 copper. Exothermic connection shall be made between conductor, ground rod and ground bus.
3. Provide separate 4/0 copper conductor from ground bus to:
4. XO terminal of each transformer.
5. Each high voltage switch ground bus.
6. Secondary service equipment ground bus.
7. Transformer high voltage grounded terminal (if required).
8. Provide full size 600V copper THHN/THWN or XHHW-2 grounding conductor in each conduit, raceway or enclosure, which contains high voltage conductors. Terminate at ground bus of equipment containing high voltage terminations. Connect to ground rod and grounding conductor in manhole.
9. Bond each enclosure containing high voltage parts (switches, fuses, transformers, pull boxes, etc.) to room ground bus with 4/0 copper conductor.
10. Bond all conduits containing high voltage conductors or secondary service conductors to penetrated enclosures using grounding bushing and #4 copper conductor. Attach to penetrated enclosures using grounding bushing and #4 copper conductor. Attach to penetrated enclosure using compression lug on stud or bolt and Belleville washers.
11. Bond all conduits carrying individual grounding or grounding electrode conductors with grounding bushing and separate #4 copper grounding conductor to ground bus.
12. Provide #10 stranded wire from each termination shield drain wire to ground bus within enclosure. Connect to nearest grounded conductor if ground bus is not within 24". Route shield drains away from energized parts. Make connections with "Sta-Kon" type terminals or tool applied tap connectors.
13. Provide ground rod in each section of each secondary switchboard. Make Exothermic or UL Listed Mechanical connection between 4/0 copper to ground rod and to switchgear ground bus.

B. LESS THAN 600 VOLT SYSTEM GROUNDING:

1. Supplementary Grounding Electrode: Use driven ground rod
2. Provide code sized copper grounding electrode conductor from secondary switchboard ground bus, each separately derived system neutral, secondary service system neutral to street side of water meter, building steel, ground rod, and any concrete encased electrodes. Provide bonding jumper around water meter.
3. Bond together system neutrals, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.
4. Install ground grid under access floors where indicated. Construct grid of #4 AWG bare copper wire installed on 72-inch centers both ways. Bond each access floor support pedestal to grid.
5. Bond together each metallic raceway, pipe, duct and other metal object entering space under access floors. Bond to underfloor ground grid. Use #4 AWG bare copper conductor.
6. Equipment Grounding Conductor: Provide separate, insulated equipment grounding conductor within each raceway. Terminate each end on suitable lug, bus, enclosure or bushing. Provide a ground wire from each device to the respective enclosure.
7. Provide communications system grounding conductor at point of service entrance and connect to building common grounding electrode system.
8. Telecommunications and Audio Visual systems shall be installed with an isolated grounding system, which has only one ground point. That ground point is to be the common grounding electrode system at the electrical service entrance for the building. Contractor is to provide an isolated grounding conductor from the electrical service entrance of the building to each Telecommunications Grounding Bus Bar (TGBB) in each Telecommunication Room. Use a minimum No. 2/0 AWG copper conductor, or as indicated on the plans, for the telecommunications service grounding conductor. Leave 10 feet slack grounding conductor at each Telecommunications Room. The grounding conductor MUST NOT be attached to building steel (except as allowed at the main electrical service entrance).

9. Telecommunications Equipment Rack Grounding: Use a #6 or larger AWG copper conductor from all telecommunications cabinets and racks to the Telecommunications Grounding Bus Bar (TGBB) in each Telecommunication Room.
10. Inspect the ground system for adequate termination at all devices.

3.21. LIGHTNING/SURGE ARRESTERS

A. Inspect for physical damage such as chipped or fractured porcelain. Wipe clean. Perform a ground continuity test to ground system. Verify the proper mounting and adequate clearance. Verify the voltage of the units with system one line diagram. Report any discrepancies. Verify that the electronic surge protection is connected properly and status lights are normal.

3.22. INSTRUMENT TRANSFORMERS

A. Inspect for physical damage. Inspect nameplate information for compatibility with one-line drawings. Verify the transformers' connections with the system requirements.

B. Verify tightness of all bolted connections and assure adequate clearances exist from primary circuits to secondary circuit wiring and to grounds.

C. Verify that all required grounding and shorting connections exist and that those connections have good contact; i.e. sufficient surface area, good cleanliness, and proper pressure.

D. Test the proper operation of transformer withdrawal mechanism and the grounding operation when applicable. Verify proper primary and secondary fuses and required sizes.

3.23. PROTECTIVE RELAYS

A. All relays shall be inspected for physical damage. Inspect cover gaskets and cover glass for presence of foreign material and moisture and then clean.

3.24. METERING AND INSTRUMENTATION

A. Examine all devices for broken parts, damage and wire connection tightness. Meter selector switches shall be inspected for proper application and operation.

3.25. BATTERY SYSTEMS

A. Inspect for physical damage and evidence of corrosion. Clean units.

B. Measure system charging voltage and each individual cell voltage. Measure the electrolyte specific gravity and level. Verify and compare measured values with manufacturer's specifications.

3.26. MECHANICAL AND ELECTRICAL INTERLOCK SYSTEM

A. Physically test each system to insure proper function, operation and sequencing. Closure attempt shall be made on locked open devices. Opening attempt shall be made on locked closed devices. Key exchange shall be made with devices operated in off normal positions.

3.27. OUTDOOR BUS STRUCTURES

A. Examine bus and supports for defects, such as cracked welds, chipped porcelains, etc. Check tightness of accessible bolted bus joints by calibrated torque wrench method. Refer to manufacturer's instruction for proper foot-pound levels. Inspect for evidence of foreign material such as bird nests, collection of dust, missing or damaged rain guards. Inspect for cleanliness.

3.28. TRANSFORMERS

A. Test and adjust the cooling fans, controls and alarm functions. Measure secondary voltage phase-to-phase and phase-to-ground after final energization and prior to loading. Verify and/or connect transformer "XO" to ground, load side of "WYE" systems.

3.29. METAL ENCLOSED BUS DUCT

A. Bus shall be inspected for physical damage, cleanliness and proper connection in accordance with the single line diagram. Inspect for proper bracing, suspension, alignment and enclosure ground. Check tightness of bolted joints by calibrated torque wrench method. Make close inspection for any indication of environmental influence on the bus enclosure (i.e. foreign material), which could affect insulation resistance by reducing clearance phase-to-phase or phase-to-ground.

3.30. GROUND FAULT SYSTEMS

A. Inspect for physical damage. Inspect the neutral main bonding connection to assure:
   1. Zero sequence system is grounded upstream of sensor.
   2. Ground strap systems are grounded down stream from the sensing device.
   3. Ground connection is made ahead of the neutral disconnect link.

B. Monitor panels (if present) shall be manually operated for:
   1. Trip tests
   2. No trip tests
   3. Nonautomatic reset

C. Ground fault device circuit nameplate identification shall be verified by device operation. Insure control circuit has disconnectable fuse device with current limiting fuses.

3.31. SWITCHBOARDS (LOW VOLTAGE)

A. Visual and Mechanical Inspection:
   1. Inspect for physical, electrical and mechanical conditions. Re-torque all bolted connections.
   2. Compare equipment nameplate information with latest single line diagram and report discrepancies.
   3. Inspect for proper alignment, anchorage and grounding
   4. All doors, panels and sections shall be inspected for paint, dents, scratches, and fit.
   5. Inspect cleanliness

B. Clean switchboard enclosure using the following methods:
   1. Loosen attached particles and vacuum them away.
   2. Wipe all porcelain with a clean, dry, lint-free rag.
   3. Clean all insulator grooves.
   4. Vacuum inside of switchgear enclosure
   5. Lubricate per manufacturer's recommendations.
   6. All active components shall be exercised and cleaned where possible.
   7. All indicating devices shall be inspected for proper operation.

3.32. MEDIUM VOLTAGE TAP BOXES (G&W type, 5 kV and above)

A. External Inspection:
   1. Check that the cable boxes are pressure tight (a positive pressure).
   2. Check all nuts and bolts on cable entrances and lids for tightness.
   3. Inspect exterior of box for evidence of rusting or corrosion. Boxes that are rusted or corroded shall be cleaned, scrapped, brushed and painted.

B. Internal Maintenance:
   1. Check all porcelain or bakelite insulators for cracks, chips and surface tracking. Replace where necessary.
   2. Inspect all mechanical and electrical connections to insure that they are tight.
   3. Clean any dirt from the interior of the box and insulator surfaces.
   4. Replace all existing gaskets with new.
   5. Pressurize the box to 3 PSIG with dry nitrogen for 15 minutes. Check for leaks by applying soapy water to all joints, watching for leaks, as indicated by soap bubbles. Tighten joints per manufacturer's requirements.
   6. Install 0-15 PSI air gauge with necessary fittings and pressurize the box with dry nitrogen to 3 PSI. All tap boxes should be purged prior to the completion of the project.

C. Oil and compound leaks in the potheads/stuffing boxes shall be corrected and repaired as follows:

1. Remove the pothead/stuffing box and the cables. Clean pothead/stuffing boxes.
2. Provide new gaskets, seals, "O" rings, etc., sized exactly for the cable diameter.
3. Prepare cable, terminate, wipe lead, replace with new compound.
4. Existing cable lengths are critical. Handle with care.

3.33. OIL FUSED CUTOUTS AND OIL SWITCHES

A. Oil and compound leak in building vaults and manholes shall be corrected and repaired as follows:

B. Oil: Drain oil, provide new seals and prepare cable for the new termination. Replace the insulating
C. oil with new oil.

D. Pothead Compound: Remove pothead and cables. Clean pothead, provide new gaskets, seals, "O" rings, etc., sized exactly for the cable diameter. Prepare cable, terminate, wipe lead, replace with new compound.
E. Existing cable lengths are critical. Handle with care.

F. Verify and record fuse sizes in the oil fused cutouts.

3.34. UPS SYSTEM

A. Operate and test the system per the manufacturers spec. Confirm the batteries and liquid level along with the transfer scheme.

3.35. MOTOR STARTERS AND MOTOR CONTROL CENTERS

A. Verify the control circuits. Confirm the fusing and the grounding of the control transformers. Torque all of the connections. Confirm the overload elements and the circuit breakers(fuse) for proper sizing. Verify all grounding. Operate and test each motor starter for proper operation.

END OF SECTION

SECTION 26 51 13
LIGHTING EQUIPMENT AND CONTROL

Contents

PART 1 - GENERAL

1.1. SCOPE

A The work under this section includes interior and exterior luminaires and accessories, exit signs, lamps, and ballasts.

1.2. REFERENCES

A ANSI
B NFPA
C IES
D NEC

1.3. SUBMITTALS

Accurately record location of switches, power supplies, and control enclosures. Include description of switching and circuiting arrangements. Include replacement part numbers.

1.4. EXTRA MATERIAL

Provide 5% spare parts of ballasts, lamps, relays (for time clocks etc.) and sensors of each type. If fewer than 20 pieces are used, provide at least one spar part.

1.5. QUALITY ASSURANCE

Installer: Trained by manufacturer to install and adjust lighting controls used

To ensure quality and reliability all equipment shall have a defect rate of less than 1/3 of 1% and shall have a 5-year warranty. All equipment shall be UL and CUL listed. All low voltage systems shall work with 12V/24V for switching or 10V for dimming signals.

PART 2 - PRODUCTS

2.1. OCCUPANCY AND PHOTO SENSORS

A Approved Manufacturers: Sensorswitch

B All devices shall be rated to operate at temperatures of –40°F

C If not specified furthermore a line-voltage version of a sensor or relay is to be used. If a lighting load above the sensor-approved wattage is to be controlled, a relay or series of relays are to be installed. All additional equipment is to be approved by the primary lighting control manufacturer.

D Powerpack and Relays:

1. For ease and speed of installation, power and auxiliary relay pack shall have 1/2" snap-in nipple for 1/2" knock-outs and mounting on outside of enclosure.
2. Power and auxiliary relay packs shall have dry contacts capable of switching 20 amp ballast load, 13 amp incandescent, 1 hp @ 120 VAC, 60Hz; 20 amp ballast @ 277 VAC, 60 Hz; 15 amp ballast @ 347 VAC, 60Hz; 15 amp ballast, 1 hp @ 220-240 VAC, 60 Hz; and 20 amp ballast, 13 amp incandescent, 1 hp @ 220-240 VAC, 50 Hz.
3. Relay Circuit Protection shall employ AC-semi conductor in parallel to relay to perform the actual ON/OFF switching.
4. Power packs shall provide a 15-24 VDC, 150 mA output.
5. Power packs shall be capable of parallel wiring without regard to AC phases on primary.
6. Powerpack shall be plenum rated.
7. Slave packs have to meet the same criteria except power supply.

E Indoor Sensors:

1. Occupancy sensors employ Infrared (IR) Technology, or passive microphonic (PM) or a combination of IR and PM (IR-PM). The latter is referred to as Dual-Tec (DT). No ultrasonic technology shall be used.
2. All sensors of one type shall be of like manufacturer and shall be interchangeable in mounting, utilizing the same size cutouts, connectors, etc.
3. All sensors shall have the following optional features:
   a) Photosensor: Sensors shall be able to auto calibrate and to differentiate between artificial and natural light. Sunlight discount factors, incremental setpoint adjustment and manual adjustments must be possible. Sensor must be programmable in 1 fc steps up to 10 fc and in 10 fc steps up to 100 fc. Auto-Setpoint of lighting level must be possible. 10% dead band must prevent lights from turning off when lighting level is above setpoint. Adaptive 5-25 minute delay must prevent system from cycling on cloudy days.
   b) Available options must include: fixture mount/ceiling mount, single zone/dual zone
   c) Dimming Sensor must be On/Off & automatic dimming (capable of completely switching off ballast).
   d) Voltages from 120 V – 347 V (exact voltage determined by contractor)
   e) Timer for shut off shall be pre-set to 10 minutes after last detection of occupancy. That time shall be changeable to up to 20 minutes.
   f) Occupancy sensor design/installation shall provide for the lighting system to automatically remain in operation upon a failure of the occupancy sensor.
   g) Mounting Bracket for deep fixtures
   h) 2-pole operation (contractor shall use 2-pole version if needed and include price in bid)
   i) Separate independent relay for building automation system (low voltage sensor only)
   j) Dual Tec (microphonic)

F Outdoor Motion Sensors:

1. Approved manufacturers: RAB Lighting
2. Sensor is to be mounted on a swivel or a box either on a wall, pole or ceiling.
3. Sensor shall operate at temperatures from –40°F (-40°C) to 130 °F (54°C) and is to be rain-tight and weatherproof. Sensor shall be UL listed for wet location.
4. Photosensor shall be adjustable to 0.5 to 200 fc settings.
5. Wide sensitivity control shall allow adjustment of sensitivity from 30% to 100%. Sensitivity adjusts automatically for consistent detection in hot and cold ambient temperatures.
6. Sensor shall detect 180° out and 360° down for total detection.

G Outdoor Photo Sensor:

1. Approved manufacturers: Fisher Pierce ES (energy saving) series

2.2. 0 TO 10V ANALOG CONTROLS

A The output of the controller shall be a steady DC voltage. When the control level is constant, the output shall not change by more than +/-20mV. The output shall vary between 0 and 10 volts. Zero voltage represents off condition and ten volts is full on. The output voltage shall never be less than -0.5V and no more than +10.50V. Output voltage levels are to be measured with a load of 20 kohm.

B Passive controllers, with un-buffered outputs, shall use potentiometers with a resistance value of 10K ohms or less (=output impedance of 5 kohms or less). Active controllers with buffered outputs must have output impedance of 100 ohms or less and be capable of continuously sourcing at least 2.0 milli-amperes.

C Controllers and output devices shall be provided with a blocking diode (or similar circuit) such that each output presents an open circuit to any source voltage of more than itself. The blocking diodes allow multiple controllers or outputs to be parallel to control the same dimmers or receivers on a "highest takes precedence" basis.

D Controllers and output devices have current limiting on all outputs such that they are not damaged by short circuits to signal common. The control signal and all control connector pins shall be isolated from AC mains (line and neutral). The control signal shall be isolated from earth ground.

E Dimmer or other receiving device must produce an output condition corresponding to "off" with 0V input control voltage level and to "full" with 10V input control voltage level. The device must be capable of accepting any voltage between -0.5V and +15V without damage. Voltage higher than +15V shall cause the device to remain at "full on". The input impedance of a dimmer or other receiving device shall be a nominal 100 Kohms (+/-20%). One controller output can be connected to multiple inputs, so the controller can see much lower impedances than 100 kohms.

2.3. TIME CLOCKS

A Approved Manufacturers: Tork

B Time clock shall be capable of automatic adjustment to daylight saving changes and holidays and must incorporate an astronomical timeclock for sunrise/sunset schedule of events. Mechanical clocks are not acceptable.
Contractor shall provide Lighting relay(s) as needed for switching the load/voltage

2.4. TIMER

A Approved Manufacturer: Leviton, Intermatic

B The switch shall be settable to 1, 2, or 4 hour delays with 4 stages

C The delay timer shall have an OFF button to override time delay.

D Switch shall be rated for 120/277V, 1800W load.

E LED shall indicate LOAD-on and approximate time remaining.

2.5. LUMINAIRES AND ACCESSORIES

A Lighting fixtures shall include wiring channel, end plates, end caps, side panels, top reflectors, bottom closures, lamp holders, lamps, ballasts, suspension stems, wiring and all other necessary materials and devices. The wiring channel, end plates, and other sheet steel enclosure components shall be cold-rolled carbon sheet steel of commercial quality not less than No. 20 USS gauge in thickness.

B Contractor shall furnish and install all end caps and all other material necessary to provide a finished look. This may require different material for fixtures mounted in rows or for single fixtures.

C Reflector shall be specular aluminum type with 95% reflectance or higher.

Recessed Can-fixtures:

1. Fixtures must be IC-Rated and be approved for zero clearance insulation cover (IC) by an OSHA NRTL laboratory. For recessed downlight fixtures that are IC-Rated, product packaging must clearly state this rating. The language must be clearly visible on the product packaging. The IC-Rated designation will also be included in the fixture description included in the Qualified Product list posted on the ENERGY STAR Web site. Sample language: "IC-Rated for direct contact with insulation".
2. Fxtures must be Air-Tight (AT) rated, product packaging must clearly show that the fixture produces less air leakage than 2.0 CFM at 75 Pascal when tested in accordance with ASTM E283. The language must be clearly visible on the product packaging. The "air tight", or similar, designation will also be included in the fixture description included in the Qualified Product list posted on the ENERGY STAR Web site. Sample language: "Certified Air Tight per ASTM E283." Reflectors must be included to maximize fixture efficiency. Installation instructions must be included listing all components of the assembly that will be necessary to ensure an airtight installation and how the components should be properly installed. For example, depending on the method used to achieve air-tight operation, the instructions should alternatively show how a gasket is to be attached, what type of caulk to use and how it should be applied, or which certified airtight trim kits are designed to be installed with the luminaire housing.

D Only LED luminaires are acceptable in recessed can-type fixtures.

2.5. EXIT SIGNS AND EMERGENCY LIGHTING

A Approved Manufacturer: Lithonia Quantum Series

1. Mounting Method: For ceiling, back, end mounting or recessed as required by location.
2. Finish: White face for both with clear baked enamel protective coating.
3. Height of Letters: 6-inches (150 mm).
4. Number of Faces: As required at the location of the fixture while meeting all codes.
5. Self Diagnosis: EXIT sign shall have self-diagnosis button for testing.
6. Lamps: Light-emitting diode (LED), red color for EXIT signs.
7. Sign must be listed in accordance with UL 924. LEDs must have 25 years rated life.

B For outdoor, wet or unheated areas an appropriate product listed as suitable or the location by the manufacturer must be used.

2.6. EXTERIOR LUMINAIRES AND ACCESSOIRES

A If a ballast is present in the fixture, it must be accessible to and removable by an electrician without the cutting of wires and without damage to the fixture housing, trim, decorative elements or the carpentry (e.g., ceiling drywall) to which the fixture is attached.

B Fixtures must be compliant with NFPA 70, the National Electrical Code (NEC), including requirements for wet or damp locations (Articles 410-4a and Article 100). Fixture must be water- and dust tight and corrosion resistant.

C Ballast and Driver must be rated to start lamp at -20°F.

D Size and provide fuse according to the load of the fixture. Furnish and install a fuse holder and fuse sized according to the load in each ungrounded leg of the electrical circuit supplying the outdoor luminaire. Every luminaire shall be separately fused with a waterproof fuse holder. Size the fuse for the amperage of the luminaire. Tap the circuit conductors with a minimum #10 AWG conductor to serve the luminaire. The fuse and holder shall be accessible through the handhole.

E Furnish poles as specified in schedule on Drawings. Poles shall be galvanized. Handhole in pole shall have removable weatherproof cover. Anchor bolts as recommended by pole manufacturer. Provide template, flat washers, lock washers, and hex nuts for each pole.

F No precast bases for poles are permitted. Construct from reinforced concrete in sizes as shown on drawings and to meet the minimum structural requirements of COMM.53.28 - Pole foundations. The exposed surface area of the foundation shall have the forms removed and the concrete rubbed out to a smooth finish.

G Provide 3/4" X 10'0" ground rods in the pole foundation so that the ground rod projects 3" up into center of pole base.

2.7. FLUORESCENT LAMPS AND BALLASTS

A All Lamps shall pass all federal TCLP (Toxicity Characteristic Leaching Procedure) test requirements in effect at the time of manufacture.

B Color temperature shall be 4100 K for all applications and color rendering index CRI shall be 82 or greater. Low light level applications (1 fc and less) shall employ 5000K color temperature.

C The Contractor shall label each ballast with its installation date in a manner that enables warranty enforcement over 5 years. Manufacturer shall provide written warranty against defects in material or workmanship, including replacement, for five years from date of manufacture.

D The ballasts shall not have any PCB's and shall be labeled to not contain PCB permanently.

E Ballast must meet FCC requirements for consumer use (FCC 47 CFR Part 18 Consumer Emission Limits) and must meet Per ANSI C82.11b, paragraph 5.10.1 (100kHz Ring Wave, 2.5kV, both common mode and differential mode, 7 strikes). Ballasts shall be a high frequency electronic type, and operate lamps at a frequency above 40 kHz to minimize interference with infrared control systems. Ballasts shall comply with FCC Part 18 Non-Consumer Equipment for EMI (power line conducted) and RFI (Radiated).

F Ballasts shall provide transient immunity as recommended by ANSI C62.41-1991, Location A2. Ballasts shall operate lamps with no visible flicker (<3% flicker index).

G Ballasts shall tolerate sustained open circuit and short circuit output conditions without damage.

H Ballasts shall be Underwriters Laboratory (UL 935) listed, Class P, Type 1 Outdoor, and CSA certified where applicable.

I Ballasts shall operate from 50/60 Hz input source of 120 through 277 Volts, and sustained variations of ± 10% (Voltage & Frequency) with no damage to the ballasts.

J All ballasts that operate lamps sized T5 and smaller must contain an end of life protection circuit. For ballasts that operate multiple lamps and are required to have end of life protection, the ballast must shut down no more than two lamps when one of the lamps has reached end of life.

K T8 SYSTEMS:

1. All lamps shall have a rated life of 30,000 on 3-hour cycle and Minimum Starting Temperature 0°F (-18°C). Color Rendering Index CRI shall be at least 85.
2. Lamp-ballast combination efficacy shall be:
3. 75 MEAN lumen per Watt for 1-lamp systems
4. 89 MEAN lumen per Watt for 2-lamp systems
5. 84 MEAN lumen per Watt for 4-lamp systems
6. 4' lamps shall have an initial light output of 3100 lumen.
7. Approved lamp model: Sylvania FO32/841/XPS/ECO, or equal
8. Ballast shall be programmed start type
9. Ballasts (1-4 lamp) shall operate as a Parallel Circuit, allowing remaining lamp(s) to maintain full light output if one or more lamps fail.
10. Ballast shall have a maximum ionization current (Glow Current) of 10 mAmps during the preheating interval.
11. Lamp Current Crest Factor (ratio of peak to RMS current) shall be 1.6 or less in accordance with lamp manufacturer recommendation and ANSI C82.11-1993.
12. Ballasts shall tolerate operation in ambient temperatures up to 105°F (40°C) without damage. Ballast shall have a minimum start temperature of 0°F (-18°C).

13. Ballast shall have a Ballast factor greater than .88, per ANSI C82.11-1993. Ballast Factor for Low Power (L) models shall be greater than .70. Ballast Factor for Extra-Low Power (XL) models shall be greater than .59.
14. Power Consumption on standard 32 W lamp and normal-ballast factor shall be not greater than 30W, 59 W, 84 W and 112 W for 1-lamp, 2-lamp, 3-lamp, and 4-lamp application respectively. Power Consumption on standard 32 W lamp and low-ballast factor shall be not greater than 25W, 47W and 68, W for 1-lamp, 2-lamp and 3-lamp and application respectively.
15. Input current Total Harmonic Distortion shall not exceed 10%.
16. Ballasts shall have a Power Factor greater than 0.98, for primary application.
17. Approved Models: GE UltraStart or equal

M T5 SYSTEMS

1. Lamp-ballast combination efficacy for T5 shall be
2. 86 MEAN lumen per Watt for 1-lamp systems
3. 88 MEAN lumen per Watt for 2-lamp systems
4. Minimum Starting Temperature-20°F (-18°C)
5. Lamps shall have a rated life of 30,000 hours at a 3-hour cycle on ANSI standard ballast. .
6. Color Rendering Index CRI is to be at least 85.
7. 4'- Lamps shall have an initial light output of 3050 lumen (<5000 K) and 2900 lumen (500K) and mean light output of 2810 lumen (<5000 K) and 2670 lumen (5000K).
8. 2'- Lamps shall have an initial light output of 1350 lumen (<5000 K) and1300 lumen (5000K) and mean light output of 1240 lumen (< 5000 K) and 1190 lumen (5000K).
9. Approved Models: GE F28/WT5/841HL/ECO, GE F14/WT5/841/WM/ECO or equal
10. Ballast shall be Programmed Start
11. Ballast shall incorporate lamp shutdown circuitry for end of lamp life protection
12. Ballast shall allow for re-lamping without the need to cycle power
13. Lamp Current Crest Factor (ratio of peak to RMS current) shall be 1.6 or less in accordance with lamp manufacturer recommendation and ANSI C82.11-1993.
14. Ballast shall have a Ballast Factor of 0.95 per ANSI C82.11-1993.
15. Power Consumption on standard 28 W lamp shall be not greater than 32W and 65W for 1-lamp and2-lamp application respectively.
16. 4-lamp ballasts shall enable bi-level switching (from 4 to 2 lamps).
17. Input current Total Harmonic Distortion shall not exceed 10% for the primary lamp.
18. Ballasts shall have a Power Factor greater than .98.
19. Approved Models: Sylvania QTB 2x28T5/UNV PS95SC or equal
20. Dimming and bi-level ballasts to be used as on schedule
21. Dimming ballast:
    a) Lamp Current Crest Factor (ratio of peak to RMS current) shall be 1.7 or less in accordance with lamp manufacturer recommendation and ANSI C82.11-1993.
    b) Ballasts shall tolerate operation in ambient temperatures up to 105°F (40°C) without damage.
    c) Ballast shall have a Ballast Factor greater than .99 per ANSI C82.11-1993, in the 100% light position.
22. Power Consumption on standard 54 W lamp and ballast factor 1.00 shall be not greater than 62W and 120 W for 1-lamp and 2-lamp application respectively. Power Consumption on standard 54 W lamp and ballast factor 0.01 shall be not greater than 8W and 18 W for 1-lamp and 2-lamp application respectively.
23. Ballasts shall have a Power Factor greater than .98 for primary lamp.
24. Ballasts shall provide rapid starting sequence consistent with ANSI standard C82.11-1993.
25. Ballast 10-1 volt (DC) control leads shall have safety/protection circuitry to protect the ballast against improper wiring of line voltage (AC) to control leads (DC). In the event of improper wiring, the ballast will operate with no harm to the ballast or user.
26. Approved Models: Sylvania Quicktronic PowerSense or equal

N T5HO SYSTEMS

1. 74 MEAN lumen per Watt for 1-lamp systems
2. 77 MEAN lumen per Watt for 2-lamp systems
3. Minimum Starting Temperature -20°F (-18°C)
4. Lamps shall have a nominal efficacy of 88 Lumens/Watt (color temperature 5000K) and 87 Lumens/Watt (color temperature 6500 K).
5. Lamps shall have a rated life of 30,000 hours at a 3-hour cycle on ANSI standard ballast. .
6. Color Rendering Index CRI is to be at least 85 (5000K).
7. Lamps shall have an initial light output of 4800 lumen (5000 K) and 4750 lumen (6500K) and mean light output of 4600 lumen (5000 K – 6500 K).
8. Approved Models: GE F54T5/841/ECO or equal
9. Ballast shall be Programmed Start

10. Ballast shall incorporate lamp shutdown circuitry for end of lamp life protection
11. Ballast shall allow for re-lamping without the need to cycle power
12. Lamp Current Crest Factor (ratio of peak to RMS current) shall be 1.6 or less in accordance with lamp manufacturer recommendation and ANSI C82.11-1993.
13. Ballasts shall tolerate operation in ambient temperatures up to 105°F (40°C) without damage. Ballast shall operate at 0°F (-18°C)
14. Ballast shall have a Ballast Factor of 1.00 per ANSI C82.11-1993.
15. Power Consumption on standard 54W W lamp shall be not greater than 61 W, 122 W, 185 W, 238 W for 1-lamp, 2-lamp, 3-lamp and 4-lamp application respectively.
16. 4-lamp ballasts shall enable bi-level switching (from 4 to 2 lamps).
17. Input current Total Harmonic Distortion shall not exceed 10% for the primary lamp.
18. Ballasts shall have a Power Factor greater than .98.
19. Approved Models: GE UltraStart or equal

O Emergency Ballast:

1. Ballast automatically tests for 30 seconds every 30 days and 90 minutes annually. Ballast continuously monitors charging current and battery voltage.
2. Visible LED and audible alarm alerts to ballast status.
3. 1 or 2 lamp operation shall be possible, 2-lamp to be used for fixtures with 2+ lamps
4. Lumen output shall be at 1400 lumen
5. Approved Models: Lithonia PS1400-SD

PART 3 – EXECUTION

3.1. INSTALLATION

A All lighting control shall be programmed according to owner's instruction and needs. This includes but is not limited to timers, delays, sensitivity and other adjustment options. Contractor shall re-program controls at least once if the original program doesn't meet the city's needs.

B All controls in one are, zone or room shall be grouped together in one box according to owner's need. All switches, timers and controllers shall be labeled to indicate the fixtures controlled.

C Contractor shall verify all existing voltages before bidding. If required voltage is not available, contractor shall provide wiring to nearest panel that has enough capacity and proper voltage. Contractor shall change design and material upon approval by engineer as needed to provide the intended function at no additional cost.

D Mount fixtures in same height as original fixtures unless noted otherwise. If fixtures are to be mounted at different location or did not exist before, clarify exact location and height with owner on site. Install fixtures in even grid, such as standard 10'x8' and in coordination with ceiling grid if available. Keep all fixtures and devices clear off pipes, ducts, radiators and other obstructions and coordinate exact location on site with project manager.

E Provide all mounting material needed. Suspended fixtures longer than 4' shall be backed by Uni-Strut. Mount suspended fixtures and rows of fixtures on Uni-Strut and attach Uni-Strut to ceiling with threaded rods. Install rods not more than 6 feet apart. Contractor shall provide stiffeners, bracing, backing plates and supporting brackets required for proper installation of all equipment. Where indicated, use existing mounting hardware and upgrade mounting to meet specifications for new mounting hardware.

F All openings caused by removal of old fixtures are to be patched by contractor with like material to match surroundings. Maintain all fire ratings while penetrating plenums, walls or ceilings. Provide sleeves if necessary to provide existing or specified fire rating. Painting is not necessary unless noted otherwise. Remove all abandoned material, equipment and cable. Properly dispose all removed material unless noted otherwise.

G Install all wiring inside ceiling and wall unless wiring can not be fished through. Provide surface mounted raceway and/or conduit in surface mounted wiring with approval by owner. Surface mounted raceway or conduit shall be painted to match finishing in finished spaces. All cable and wire inside wall and ceiling shall be in metal conduit and up to electrical code. All conduit shall be 3/4" or large. Turns between access boxes should not be more than 270°. All low voltage cable shall be plenum rated.

H Connect receptacles and lighting to existing branch circuits where available and provide new circuits including all wiring and breakers from existing panel boards as needed. Light and receptacles shall be kept on separate circuits and branch and panel

capacity must be confirmed. Provide wiring to generator circuit for emergency fixtures in case generator is on site, otherwise use battery-backup ballast from schedule. Mount EXIT and emergency light units on wall and provide all necessary wiring unless ceiling mounting is the only possible mounting method.

I Provide disconnect for service of ALL fixtures and sensors per NEC 410.130 (G). If fixture higher than 8' provide disconnect within reach of fixture. Provide means of disconnect that visibly show ON/OFF from location of fixture. Include lighting control equipment (i.e. powerpack, line-voltage sensor) in disconnected circuit. Cord & plug. Twist lock or separate switches are acceptable for disconnects as long as they are rated for location (i.e. wet). Manual switches in space may substitute as disconnects upon approval by owner.

3.2. ELECTRICAL PANEL ILLUMINATION

A Provide fixture above electrical panel with separate manual light switch. DO NOT provide automatic control of that fixture to comply with NEC requirements for electrical panel illumination. The manual switch shall include a pilot light indicating when the switch is on and be labeled “FOR ELECTRICAL REPAIR ONLY – TURN OFF FOR NORMAL OPERATION!”
Locate fixture approximately 1’ above panel and 18” away from wall and attach to wall or ceiling ensuring light shines on the panel to work on.

B Fixture is to be a 2-lamp fixture with parallel wired ballast unless noted otherwise.

3.3. SENSORS

A Drawings indicate type of sensor. Contractor is to determine if ceiling or fixture mounted sensor is to be used. All finished ceilings, such as suspended ceilings and drywall ceilings, require ceiling mounted sensors. Industrial applications, such as high bay, shop areas, storage rooms, may require fixture mount type sensor. City remains the right to require different mounting options at no extra cost to the city. Contractor shall confirm mounting type for each space with city before ordering.

B Sensors have to be placed to enable early detection when person enters the zone and have to avoid detection from bypassing persons in adjacent zones. Locations on drawings are not to be considered correct and may have to be adjusted to enable proper function. Place all sensors to perform properly (early detection, no false detection, correct lighting level). Location of sensors on drawing is not correct and has to be adjusted in the field to function properly. Sensors shall receive permanent label visible from space side indicating the model number.

C All sensors with photo-option are to be installed and set in order to enable sufficient illumination on typical work surfaces (i.e. desk) during all daylight conditions. If enough daylight is available they shall shut off light completely. Coordinate with city on exact location and settings for sensor. Auto-calibrate sensor after all lighting is installed and operating. Sufficient lighting levels have to be maintained with or without available daylight.

D Flexible conduit behind suspended ceiling (i.e. acoustic, drywall) shall enable relocation of sensor by 5 feet in any direction.

E Sensors shall receive permanent label visible from outside indicating the model number.

3.4. INTERIOR LUMINAIRE INSTALLATION

A Locations shown are approximate only. Install at locations shown on architectural drawings and as required to coordinate with tile patterns, architectural features, and Mechanical Work. Locate fixtures to clear mechanical and other installations. Center Fixtures and provide even grid wherever possible. Enable proper illumination of most used work surfaces. Consult project manager prior to installation.

B The Contractor shall install fixture supports as required. Fixture installations with fixtures supported only by insecure boxes will be rejected. It shall be the Contractor's responsibility to support all lighting fixtures adequately, providing extra steel work for the support of fixtures if required. The Contractor shall provide any components necessary for mounting fixtures. No plastic, composition or wood type anchors shall be used. If fixtures bend due to their own weight contractor shall adjust mounting and provide additional support.

C Install lighting fixture diffusers and enclosures only after construction work, painting and clean up are completed. Handle with clean white canvas gloves.

D Direct box or conduit connections shall be used for surface and recessed fixtures. Flexible metal conduit from a J-box for recessed lay-in light fixtures. Flexible metal conduit shall be minimum 3/8" (10 mm) minimum diameter and six foot (1.8 M) maximum length. Conduit length shall allow movement of the fixture for maintenance purposes and relocation by 3 feet in any direction. Minimum wire size shall be #18 AWG for single fixture or master-slave fixture.

E The flexible connectors shall be all steel, galvanized, clamp type with locknut or snap-in connector including those used on the master-slave unit.

F Make wire connections within fixtures using solderless connectors as specified; automatic splicing devices or connectors will not be allowed. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

G Bond products and metal accessories to branch circuit equipment grounding conductor.

H Surface Mounted Luminaires And Exit Signs:

1. Where mounted on accessible ceilings, hang from metal channels fastened to furring members by means of hanger rods through ceiling to fixture; hanger rods with backup locking device that will allow fixture to be raised on an elevation tight to the ceiling; but not allow raising the ceiling by tightening fixture mounting nuts. Install plumb and adjust to align with building lines and with each other. Secure to prohibit movement.
2. Install wall mounted luminaires and exit signs at height as scheduled or required by code. Consult project manager before determination of height.

I Suspended Luminaires:

1. Provide pendant length required to suspend luminaire at indicated height. Use anchors suitable for structural material. Do not drill holes into structural ceiling parts. Suspension method (pendant or chain) in fixture schedule or the same as existing fixtures.
2. Provide at least one support for every 4 feet of fixture.
3. Hangers for pendant/suspended Fixtures:
4. Rigid type: not less than 5-thread engagement at each end, consisting of iron pipe, with brass or aluminum tubing casing, or supporting tubing not less than 0.040 inches thick; place hangers every 4 feet or shorter.

J High Bay Fixtures:

1. Mount on 2 attachment points
2. Support luminaires of 1 x 4 foot (300 x 1200 mm) size and larger with chains to the ceiling in order to eliminate lateral movement and level the fixtures.

K Striplite and Industrial type fixtures:

1. Use stabilizer strut or beam to stabilize suspended fixtures over the entire length of the fixtures.

L Recessed luminaires:

2. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
3. Install recessed luminaires to permit removal from below.
4. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
5. Install clips to secure recessed grid-supported luminaires in place.
6. Integral mounting bars which rotate into position after fixture is lifted into the ceiling cavity or fixtures supported by the ceiling suspension system. Provide two safety wires secured to structural members or slab above suspended ceiling or clip the fixture frame to the ceiling grid.
7. Support surface mounted luminaires on grid ceiling directly from building structure.
8. Provide 6-foot additional length on cable for fixtures and sensors mounted on suspended ceiling in order to enable later ceiling replacement without disconnecting fixtures and sensors.
9. Install code required hardware to secure recessed grid-supported luminaires in place.

M Battery Pack Emergency Lighting And Exit Signs:

1. Verify the operation per the manufacturers spec and run all of the diagnostic steps.

2. Connect all emergency lighting units and EXIT sign sense leads and battery charger leads ahead of any local switching. Test/Monitor LED must be mounted to be visible by occupants. EXIT arrows must show safest and shortest exit way according to all applicable codes.
3. Confirm operation: Entire fixture shall be switchable, lamps illuminate upon power failure, self test
4. Contractor is cautioned to coordinate exit sign locations with Architectural details. Mounting height, in general, up 90 inches or one inch above door casing where mounted over doors, verify all exit sign locations with Executive Architect-Engineer prior to installation of outlet boxes.

3.5. EXTERIOR LUMINAIRE INSTALLATION

A Install lighting poles at locations indicated. Install poles plumb. Provide shims or double nuts to adjust plumb. Use belt slings or non-chafing ropes to raise and set pre-finished luminaire poles.

B Provide double nuts to adjust plumb. Grout around each base.

C Bond each luminaire, each metal accessory, the ground rod and the pole to the branch circuit equipment ground conductor with a separate ground wire sized per NEC or as shown on the drawings.

D Minimum underground conduit size is 1 inch.

E Underground and exterior wire shall be type XHHW-2 or USE.

F Project anchor bolts 2 inches (50 mm) minimum above base. Install all anchor bolts and handhole fasteners with anti-seize compound.

G Light beam has to be aimed in a way that ensures proper illumination of walk and driveways while minimizing transitional light and light pollution.

3.6. LAMP INSTALLATION

A All lamps shall be delivered to the job in sealed cartons and protected from dirt and dust during storage on the project. Lamps shall be taken directly from the cartons and installed in the fixture with special care so that they do not become dusty and are not soiled in the operation.

B Lamps shall not be touched with unprotected hands. All stains shall be cleaned off in order to prevent burn-in of fingerprints et cetera!

C All new lamps shall be operational at final Completion of the project.

3.7. ADJUSTING AND CLEANING

A Align luminaires and clean lenses and diffusers at completion of Work. Clean paint splatters, dirt, and debris from installed luminaires.

B Aim and adjust luminaires as indicated on Drawings or as directed by the project manager.

C 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. Clean finishes and touch up damage.

G Re-lamp luminaires that have failed by date of Completion.

SECTION E: PROPOSAL

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CONTRACT NO. 6946

Bidder must state a Unit Price and Total Bid for each item. The Total Bid for each item must be the product of quantity, by Unit Price. The Grand Total must be the sum of the Total Bids for the various items. In case of multiplication errors or addition errors, the Grand Total with corrected multiplication and/or addition shall determine the Grand Total bid for each contract. The Unit Price and Total Bid must be entered numerically in the spaces provided. All words and numbers shall be written in ink.

1. The undersigned having familiarized himself/herself with the Contract documents, including Advertisement for Bids, Instructions to Bidders, Form of Proposal, City of Madison Standard Specifications for Public Works Construction - 2012 Edition thereto, Form of Agreement, Form of Bond, and Addenda issued and attached to the plans and specifications on file in the office of the City Engineer, hereby proposes to provide and furnish all the labor, materials, tools, and expendable equipment necessary to perform and complete in a workmanlike manner the specified construction on this project for the City of Madison; all in accordance with the plans and specifications as prepared by the City Engineer, including Addenda to the Contract Nos. _____ through _____ issued thereto, at the prices for said work as contained in this proposal.
2. If awarded the Contract, we will initiate action within seven (7) days after notification or in accordance with the date specified in the contract to begin work and will proceed with diligence to bring the project to full completion within the number of work days allowed in the Contract or by the calendar date stated in the Contract.
3. The undersigned Bidder or Contractor certifies that he/she is not a party to any contract, combination in form of trust or otherwise, or conspiracy in restraint of trade or commerce or any other violation of the anti-trust laws of the State of Wisconsin or of the United States, with respect to this bid or contract or otherwise.
4. Accompanying this Proposal is ☐ Bid Bond or ☐ Certified Check in the amount of _____ Dollars ($_____) or ☐ a Certificate of Biennial Bid Bond as required by the Advertisement for Bids.
   (IF BID BOND IS USED, IT SHALL BE SUBMITTED ON THE FORMS PROVIDED BY THE CITY. FAILURE TO DO SO MAY RESULT IN REJECTION OF THE BID).
5. I hereby certify that all statements herein are made on behalf of _____
   (name of corporation, partnership, or person submitting bid)
   a corporation organized and existing under the laws of the State of _____ a partnership consisting of _____; an individual trading as _____; of the City of _____; State of _____; that I have examined and carefully prepared this Proposal, from the plans and specifications and have checked the same in detail before submitting this Proposal; that I have fully authority to make such statements and submit this Proposal in (its, their) behalf; and that the said statements are true and correct.

_____
SIGNATURE

_____
TITLE, IF ANY

Sworn and subscribed to before me this
_____ day of _____, 20_____

_____
(Notary Public or other officer authorized to administer oaths)
My Commission Expires _____
Bidders shall not add any conditions or qualifying statements to this Proposal.

State of Wisconsin
Department of Workforce Development
Equal Rights Division
Labor Standards Bureau

Disclosure of Ownership

Notice required under Section 15.04(1)(m), Wisconsin Statutes. The statutory authority for the use of this form is prescribed in Sections 66.0903(12)(d) and 103.49(7)(d), Wisconsin Statutes. The use of this form is mandatory. The penalty for failing to complete this form is prescribed in Section 103.005(12), Wisconsin Statutes. Personal information you provide may be used for secondary purposes.

(1) On the date a contractor submits a bid to or completes negotiations with a state agency or local governmental unit, on a project subject to Section 66.0903 or 103.49, Wisconsin Statutes, the contractor shall disclose to such state agency or local governmental unit the name of any "other construction business", which the contractor, or a shareholder, officer or partner of the contractor, owns or has owned within the preceding three (3) years.

(2) The term "other construction business" means any business engaged in the erection, construction, remodeling, repairing, demolition, altering or painting and decorating of buildings, structures or facilities. It also means any business engaged in supplying mineral aggregate, or hauling excavated material or spoil as provided by Sections 66.0903(3), 103.49(2) and 103.50(2), Wisconsin Statutes.

(3) This form must ONLY be filed, with the state agency or local governmental unit that will be awarding the contract, if **both (A) and (B) are met**.

(A) The contractor, or a shareholder, officer or partner of the contractor:

(1) Owns at least a 25% interest in the "other construction business", indicated below, on the date the contractor submits a bid or completes negotiations.

(2) Or has owned at least a 25% interest in the "other construction business" at any time within the preceding three (3) years.

(B) The Wisconsin Department of Workforce Development (DWD) has determined that the "other construction business" has failed to pay the prevailing wage rate or time and one-half the required hourly basic rate of pay, for hours worked in excess of the prevailing hours of labor, to any employee at any time within the preceding three (3) years.

Other Construction Business			
Name of Business			
Street Address or P O Box	City	State	Zip Code
Name of Business			
Street Address or P O Box	City	State	Zip Code
Name of Business			
Street Address or P O Box	City	State	Zip Code

I hereby state under penalty of perjury that the information, contained in this document, is true and accurate according to my knowledge and belief.

Print the Name of Authorized Officer	
Signature of Authorized Officer	Date Signed
Name of Corporation, Partnership or Sole Proprietorship	

Street Address or P O Box	City	State	Zip Code

If you have any questions call (608) 266-0028

ERD-7777-E (R. 09/2003)

WEST STREETS LIGHTING RETROFIT-2013
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Best Value Contracting

1. The Contractor shall indicate the non-apprenticeable trades used on this contract.

_____

_____

_____

_____

_____

_____

_____

2. Some Contractors are exempt due to the size of the work force. Apprenticeable trades are those trades considered apprenticeable by the State of Wisconsin.

☐ Check Here if the Contractor has a total skilled work force of four or less individuals in all apprenticeable trades combined. This contractor is exempt from Best Value Contracting.

3. The Contractor shall indicate on page E-4 which apprenticeable trades are to be used on this Contract and shall indicate by checking the appropriate box for the trades used, how the contractor will comply with Madison General Ordinance 33.07(7).

Legend

Number of Journeyworkers	The Contractor shall indicated for trades to be used on this Contract only, the number of journeyworkers that the Contractor has employed company wide.
W-ATT	The Contractor is an active trade trainer in the State of Wisconsin for the trade indicated.
US-ATT	The Contractor is an active trade trainer in an apprenticeship program approved by the U.S. Department of Labor or another state apprenticeship agency in the trade indicated.
SB-ATT	The Contractor shall become an active trade trainer prior to beginning work on the Contract in the trade indicated.

☐ The Contractor has reviewed the list on page E-4 and shall not use any apprenticeable trades on this project.

☐ The Contractor has reviewed this list on E-4 and has checked the appropriate box by each apprenticeable trade to be used on the project.

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Apprenticeable Trades

Check the box in the column "Trade Used on This Project" for each apprenticeable trades used on this project. For those trades used on the project indicated the number of journeyworkers that are employed company wide and check a box to the right of the trade as to how the Contractor will comply MGO 33.07(7). Refer to the legend on page E-3 for the meaning associated with each heading. The Contractor must check one of the boxes on the right for each apprenticeable trade used and checked on the left.

Trade Used on Contract	Apprenticeable Trades	Number of Journeyworkers	W-ATT	US-ATT	SB-ATT
☐	Bricklayer		☐	☐	☐
☐	Carpenter		☐	☐	☐
☐	Cement Mason / Concrete Finisher		☐	☐	☐
☐	Cement Mason (Heavy Highway)		☐	☐	☐
☐	Construction Craft Laborer		☐	☐	☐
☐	Data Communication Installer		☐	☐	☐
☐	Electrician		☐	☐	☐
☐	Environmental Systems Technician / HVAC Service Tech/HVAC Install / Service		☐	☐	☐
☐	Glazier		☐	☐	☐
☐	Heavy Equipment Operator / Operating Engineer		☐	☐	☐
☐	Insulation Worker (Heat & Frost)		☐	☐	☐
☐	Iron Worker		☐	☐	☐
☐	Iron Worker (Assembler, Metal Bldgs)		☐	☐	☐
☐	Painter & Decorator		☐	☐	☐
☐	Plasterer		☐	☐	☐
☐	Plumber		☐	☐	☐
☐	Residential Electrician		☐	☐	☐
☐	Roofer & Waterproofer		☐	☐	☐
☐	Sheet Metal Worker		☐	☐	☐
☐	Sprinklerfitter		☐	☐	☐
☐	Steamfitter		☐	☐	☐
☐	Steamfitter (Refrigeration)		☐	☐	☐
☐	Steamfitter (Service)		☐	☐	☐
☐	Taper & Finisher		☐	☐	☐
☐	Telecommunications (Voice, Data & Video) Installer-Technician		☐	☐	☐
☐	Tile Setter		☐	☐	☐

PROPOSAL

NAME OF BIDDER

CONTRACT NAME: West Streets Lighting Retrofit - 2013

CONTRACT NO. : 6946

ACCOUNT NUMBER: CB5358460 810716 00-53W1523

		TOTAL BID
	LUMP SUM BID	

NOTE: The bidder must completely fill in the base bid and the alternates in ink. The contract will be awarded based on the lowest base bid plus the alternates listed in order of priority within the funds available for the project.

SECTION F: BID BOND

KNOW ALL MEN BY THESE PRESENT, THAT _____
(a corporation of the State of _____) (individual), (partnership), hereinafter referred to as the "Principal") and _____, a corporation of the State of _____ (hereinafter referred to as the "Surety") and licensed to do business in the State of Wisconsin, are held and firmly bound unto the City of Madison, (hereinafter referred to as the "Obligee"), in the sum of five per cent (5%) of the amount of the total bid or bids of the Principal herein accepted by the Obligee, for the payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

The conditions of this obligation are such that, whereas the Principal has submitted, to the City of Madison a certain bid, including the related alternate, and substitute bids attached hereto and hereby made a part hereof, to enter into a contract in writing for the construction of:

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CONTRACT NO. 6946

1. If said bid is rejected by the Obligee, then this obligation shall be void.

2. If said bid is accepted by the Obligee and the Principal shall execute and deliver a contract in the form specified by the Obligee (properly completed in accordance with said bid) and shall furnish a bond for his/her faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said bid, then this obligation shall be void.

   If said bid is accepted by the Obligee and the Principal shall fail to execute and deliver the contract and the performance and payment bond noted in 2. above executed by this Surety, or other Surety approved by the City of Madison, all within the time specified or any extension thereof, the Principal and Surety agree jointly and severally to forfeit to the Obligee as liquidated damages the sum mentioned above, it being understood that the liability of the Surety for any and all claims hereunder shall in no event exceed the sum of this obligation as stated, and it is further understood that the Principal and Surety reserve the right to recover from the Obligee that portion of the forfeited sum which exceed the actual liquidated damages incurred by the Obligee.

   The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by an extension of the time within which the Obligee may accept such bid, and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, on the day and year set forth below.

Seal

Principal	Date
By:	
Name of Surety	
By:	
	Date

This certifies that I have been duly licensed as an agent for the above company in Wisconsin under License No. _____ for the year _____, and appointed as attorney in fact with authority to execute this bid bond and the payment and performance bond referred to above, which power of attorney has not been revoked.

Date	Agent
	Address
	City, State and Zip Code
	Telephone Number

NOTE TO SURETY & PRINCIPAL

The bid submitted which this bond guarantees may be rejected if the following instrument is not attached to this bond:

Power of Attorney showing that the agent of Surety is currently authorized to execute bonds on behalf of the Surety, and in the amounts referenced above.

Certificate of Biennial Bid Bond

TIME PERIOD - VALID (FROM/TO)
NAME OF SURETY
NAME OF CONTRACTOR
CERTIFICATE HOLDER City of Madison, Wisconsin

This is to certify that a biennial bid bond issued by the above-named Surety is currently on file with the City of Madison.

This certificate is issued as a matter of information and conveys no rights upon the certificate holder and does not amend, extend or alter the coverage of the biennial bid bond.

Cancellation: Should the above policy be cancelled before the expiration date, the issuing Surety will give thirty (30) days written notice to the certificate holder indicated above.

Signature of Authorized Contractor Representative

Date

SECTION G: AGREEMENT

THIS AGREEMENT made this _____ day of _____ in the year Two Thousand and Twelve between _____ hereinafter called the Contractor, and the City of Madison, Wisconsin, hereinafter called the City.

WHEREAS, the Common Council of the said City of Madison under the provisions of a resolution adopted _____, , and by virtue of authority vested in the said Council, has awarded to the Contractor the work of performing certain construction.

NOW, THEREFORE, the Contractor and the City, for the consideration hereinafter named, agree as follows:

1. **Scope of Work.** The Contractor shall, perform the construction, execution and completion of the following listed complete work or improvement in full compliance with the Plans, Specifications, Standard Specifications, Supplemental Specifications, Special Provisions and contract; perform all items of work covered or stipulated in the proposal; perform all altered or extra work; and shall furnish, unless otherwise provided in the contract, all materials, implements, machinery, equipment, tools, supplies, transportation, and labor necessary to the prosecution and completion of the work or improvements:

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2. **Completion Date/Contract Time.** Construction work must begin within seven (7) calendar days after the date appearing on mailed written notice to do so shall have been sent to the Contractor and shall be carried on at a rate so as to secure full completion SEE SPECIAL PROVISIONS, the rate of progress and the time of completion being essential conditions of this Agreement.

3. **Contract Price.** The City shall pay to the Contractor at the times, in the manner and on the conditions set forth in said specifications, the sum of _____($_____) Dollars being the amount bid by such Contractor and which was awarded to him/her as provided by law.

4. **Wage Rates for Employees of Public Works Contractors**

   General and Authorization. The Contractor shall compensate its employees at the prevailing wage rate in accordance with section 66.0903, Wis. Stats., DWD 290 of the Wisconsin Administrative Code and as hereinafter provided.

   "Public Works" shall include building or work involving the erection, construction, remodeling, repairing or demolition of buildings, parking lots, highways, streets, bridges, sidewalks, street lighting, traffic signals, sanitary sewers, water mains and appurtenances, storm sewers, and the grading and landscaping of public lands.

   "Building or work" includes construction activity as distinguished from manufacturing, furnishing of materials, or servicing and maintenance work, except for the delivery of mineral aggregate such as sand, gravel, bituminous asphaltic concrete or stone which is incorporated into the work under contract with the City by depositing the material directly in final place from transporting vehicle.

"Erection, construction, remodeling, repairing" means all types of work done on a particular building or work at the site thereof in the construction or development of the project, including without limitation, erecting, construction, remodeling, repairing, altering, painting, and decorating, the transporting of materials and supplies to or from the building or work done by the employees of the Contractor, Subcontractor, or Agent thereof, and the manufacturing or furnishing of materials, articles, supplies or equipment on the site of the building or work, by persons employed by the Contractor, Subcontractor, or Agent thereof.

"Employees working on the project" means laborers, workers, and mechanics employed directly upon the site of work.

"Laborers, Workers, and Mechanics" include preapprentices, helpers, trainees, learners and properly registered and indentured apprentices but exclude clerical, supervisory, and other personnel not performing manual labor.

Establishment of Wage Rates. The Department of Public Works shall periodically obtain a current schedule of prevailing wage rates from DWD. The schedule shall be used to establish the City of Madison Prevailing Wage Rate Schedule for Public Works Construction (prevailing wage rate). The Department of Public Works may include known increases to the prevailing wage rate which can be documented and are to occur on a future specific date. The prevailing wage rate shall be included in public works contracts subsequently negotiated or solicited by the City. Except for known increases contained within the schedule, the prevailing wage rate shall not change during the contract. The approved wage rate is attached hereto.

Workforce Profile. The Contractor shall, at the time of signature of the contract, notify the City Engineer in writing of the names and classifications of all the employees of the Contractor, Subcontractors, and Agents proposed for the work. In the alternative, the Contractor shall submit in writing the classifications of all the employees of the Contractor, Subcontractors and Agents and the total number of hours estimated in each classification for the work. This workforce profile(s) shall be reviewed by the City Engineer who may, within ten (10) days, object to the workforce profile(s) as not being reflective of that which would be required for the work. The Contractor may request that the workforce profile, or a portion of the workforce profile, be submitted after the signature of the contract but at least ten (10) days prior to the work commencing. Any costs or time loss resulting from modifications to the workforce profile as a result of the City Engineer's objections shall be the responsibility of the Contractor.

Payrolls and Records. The Contractor shall keep weekly payroll records setting forth the name, address, telephone number, classification, wage rate and fringe benefit package of all the employees who work on the contract, including the employees of the Contractor's subcontractors and agents. Such weekly payroll records must include the required information for all City contracts and all other contracts on which the employee worked during the week in which the employee worked on the contract. The Contractor shall also keep records of the individual time each employee worked on the project and for each day of the project. Such records shall also set forth the total number of hours of overtime credited to each such employee for each day and week and the amount of overtime pay received in that week. The records shall set forth the full weekly wages earned by each employee and the actual hourly wage paid to the employee.

The Contractor shall submit the weekly payroll records, including the records of the Contractor's subcontractors and agents, to the City Engineer for every week that work is being done on the contract. The submittal shall be within twenty-one (21) calendar days of the end of the Contractor's weekly pay period.

Employees shall receive the full amounts accrued at the time of the payment, computed at rates not less than those stated in the prevailing wage rate and each employee's rate shall be determined by the work that is done within the trade or occupation classification which should be properly assigned to the employee.

An employee's classification shall not be changed to a classification of a lesser rate during the contract. If, during the term of the contract, an employee works in a higher pay classification than the one which was previously properly assigned to the employee, then that employee shall be considered to be in the higher pay classification for the balance of the contract, receive the appropriate higher rate of pay, and she/he shall not receive a lesser rate during the balance of the contract. For purposes of clarification, it is noted that there is a distinct difference between working in a different classification with higher pay and doing work within a classification that has varying rates of pay which are determined by the type of work that is done within the classification. For example, the classification "Operating Engineer" provides for different rates of pay for various classes of work and the Employer shall compensate an employee classified as an "Operating Engineer" based on the highest class of work that is done in one day. Therefore, an "Operating Engineer's" rate may vary on a day to day basis depending on the type of work that is done, but it will never be less than the base rate of an "Operating Engineer". Also, as a matter of clarification, it is recognized that an employee may work in a higher paying classification merely by chance and without prior intention, calculation or design. If such is the case and the performance of the work is truly incidental and the occurrence is infrequent, inconsequential and does not serve to undermine the single classification principle herein, then it may not be required that the employee be considered to be in the higher pay classification and receive the higher rate of pay for the duration of the contract. However, the Contractor is not precluded or prevented from paying the higher rate for the limited time that an employee performs work that is outside of the employee's proper classification.

Questions regarding an employee's classification, rate of pay or rate of pay within a classification, shall be resolved by reference to the established practice that predominates in the industry and on which the trade or occupation rate/classification is based. Rate of pay and classification disputes shall be resolved by relying upon practices established by collective bargaining agreements and guidelines used in such determination by appropriate recognized trade unions operating within the City of Madison.

The Contractor, its Subcontractors and Agents shall submit to interrogation regarding compliance with the provisions of this ordinance.

Mulcting of the employees by the Contractor, Subcontractor, and Agents on Public Works contracts, such as by kickbacks or other devices, is prohibited. The normal rate of wage of the employees of the Contractor, Subcontractor, and Agents shall not be reduced or otherwise diminished as a result of payment of the prevailing wage rate on a public works contract.

Hourly contributions. Hourly contributions shall be determined in accordance with the prevailing wage rate and with DWD. 290.01(10), Wis. Admin. Code.

Apprentices and Subjourneypersons. Apprentices and subjourneypersons performing work on the project shall be compensated in accordance with the prevailing wage rate and with DWD 290.02, and 290.025, respectively, Wis. Admin. Code.

Straight Time Wages. The Contractor may pay straight time wages as determined by the prevailing wage rate and DWD 290.04, Wis. Admin. Code.

Overtime Wages. The Contractor shall pay overtime wages as required by the prevailing wage rate and DWD 290.05, Wis. Admin. Code.

Posting of Wage Rates and Hours. A clearly legible copy of the prevailing wage rate, together with the provisions of Sec. 66.0903(10)(a) and (11)(a), Wis. Stats., shall be kept posted in at least one conspicuous and easily accessible place at the project site by the Contractor and such notice shall remain posted during the full time any laborers, workers or mechanics are employed on the contract.

Evidence of Compliance by Contractor. Upon completion of the contract, the Contractor shall file with the Department of Public Works an affidavit stating:

a. That the Contractor has complied fully with the provisions and requirements of Sec. 66.0903(3), Wis. Stats., and Chapter DWD 290, Wis. Admin. Code; the Contractor has received evidence of compliance from each of the agents and subcontractors; and the names and addresses of all of the subcontractors and agents who worked on the contract.

b. That full and accurate records have been kept, which clearly indicate the name and trade or occupation of every laborer, worker or mechanic employed by the Contractor in connection with work on the project. The records shall show the number of hours worked by each employee and the actual wages paid therefor; where these records will be kept and the name, address and telephone number of the person who will be responsible for keeping them. The records shall be retained and made available for a period of at least three (3) years following the completion of the project of public works and shall not be removed without prior notification to the municipality.

Evidence of Compliance by Agent and Subcontractor. Each agent and subcontractor shall file with the Contractor, upon completion of their portion of the work on the contract an affidavit stating that all the provisions of Sec. 66.0903(3), Wis. Stats., have been fully complied with and that full and accurate records have been kept, which clearly indicate the name and trade or occupation of every laborer, worker or mechanic employed by the Contractor in connection with work on the project. The records shall show the number of hours worked by each employee and the actual wages paid therefor; where these records shall be kept and the name, address and telephone number of the person who shall be responsible for keeping them. The records shall be retained and made available for a period of at least three (3) years following the completion of the project of public works and shall not be removed without prior notification to the municipality.

Failure to Comply with the Prevailing Wage Rate. If the Contractor fails to comply with the prevailing wage rate, she/he shall be in default on the contract.

5. **Affirmative Action.** In the performance of the services under this Agreement the Contractor agrees not to discriminate against any employee or applicant because of race, religion, marital status, age, color, sex, disability, national origin or ancestry, income level or source of income, arrest record or conviction record, less than honorable discharge, physical appearance, sexual orientation, political beliefs, or student status. The Contractor further agrees not to discriminate against any subcontractor or person who offers to subcontract on this contract because of race, religion, color, age, disability, sex or national origin.

The Contractor agrees that within thirty (30) days after the effective date of this agreement, the Contractor will provide to the City Affirmative Action Division certain workforce utilization statistics, using a form to be furnished by the City.

If the contract is still in effect, or if the City enters into a new agreement with the Contractor, within one year after the date on which the form was required to be provided, the Contractor will provide updated workforce information using a second form, also to be furnished by the City. The second form will be submitted to the City Affirmative Action Division no later than one year after the date on which the first form was required to be provided.

The Contractor further agrees that, for at least twelve (12) months after the effective date of this contract, it will notify the City Affirmative Action Division of each of its job openings at facilities in Dane County for which applicants not already employees of the Contractor are to be considered. The notice will include a job description, classification, qualifications and application procedures and deadlines. The Contractor agrees to interview and consider candidates referred by the Affirmative Action Division if the candidate meets the minimum qualification standards established by the Contractor, and if the referral is timely. A referral is timely if it is received by the Contractor on or before the date started in the notice.

Articles of Agreement
Article I

The Contractor shall take affirmative action in accordance with the provisions of this contract to insure that applicants are employed, and that employees are treated during employment without regard to race, religion, color, age, marital status, disability, sex or national original and that the employer shall provide harassment free work environment for the realization of the potential of each employee. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation and selection for training including apprenticeship insofar as it is within the control of the Contractor. The Contractor agrees to post in conspicuous places available to employees and applicants notices to be provided by the City setting out the provisions of the nondiscrimination clauses in this contract.

Article II

The Contractor shall in all solicitations or advertisements for employees placed by or on behalf of the Contractors state that all qualified or qualifiable applicants will be employed without regard to race, religion, color, age, marital status, disability, sex or national origin.

Article III

The Contractor shall send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding a notice to be provided by the City advising the labor union or worker's representative of the Contractor's equal employment opportunity and affirmative action commitments. Such notices shall be posted in conspicuous places available to employees and applicants for employment.

Article V

The Contractor agrees that it will comply with all provisions of the Affirmative Action Ordinance of the City of Madison, including the contract compliance requirements. The Contractor agrees to submit the model affirmative action plan for public works contractors in a form approved by the Director of Affirmative Action.

Article VI

The Contractor will maintain records as required by Section 39.02(9)(f) of the Madison General Ordinances and will provide the City Affirmative Action Division with access to such records and to persons who have relevant and necessary information, as provided in Section 39.02(9)(f). The City agrees to keep all such records confidential, except to the extent that public inspection is required by law.

Article VII

In the event of the Contractor's or subcontractor's failure to comply with the Equal Employment Opportunity and Affirmative Action Provisions of this contract or Section 39.03 and 39.02 of the Madison General Ordinances, it is agreed that the City at its option may do any or all of the following:

1. Cancel, terminate or suspend this Contract in whole or in part.

2. Declare the Contractor ineligible for further City contracts until the Affirmative Action requirements are met.

3. Recover on behalf of the City from the prime Contractor 0.5 percent of the contract award price for each week that such party fails or refuses to comply, in the nature of liquidated damages, but not to exceed a total of five percent (5%) of the contract price, or five thousand dollars ($5,000), whichever is less. Under public works contracts, if a subcontractor is in noncompliance, the City may recover liquidated damages from the prime Contractor in the manner described above. The preceding sentence shall not be construed to prohibit a prime Contractor from recovering the amount of such damage from the non-complying subcontractor.

Article VIII

The Contractor shall include the above provisions of this contract in every subcontract so that such provisions will be binding upon each subcontractor. The Contractor shall take such action with respect to any subcontractor as necessary to enforce such provisions, including sanctions provided for noncompliance.

Article IX

The Contractor shall allow the maximum feasible opportunity to small business enterprises to compete for any subcontracts entered into pursuant to this contract.

WEST STREETS LIGHTING RETROFIT-2013
CONTRACT NO. 6946

IN WITNESS WHEREOF, the Contractor has hereunto set his/her hand and seal and the City has caused these presents to be sealed with its corporate seal and to be subscribed by its Mayor and City Clerk the day and year first above written.

Countersigned:

Company Name

Witness Date

President Date

Witness Date

Secretary Date

CITY OF MADISON, WISCONSIN

Provisions have been made to pay the liability that will accrue under this contract.

Approved as to form:

Finance Director

City Attorney

Signed this _____ day of _____, 20_____

Witness

Mayor Date

Witness

City Clerk Date

SECTION H: PAYMENT AND PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we _____ as principal, and _____ Company of _____as surety, are held and firmly bound unto the City of Madison, Wisconsin, in the sum of _____($_____) Dollars, lawful money of the United States, for the payment of which sum to the City of Madison, we hereby bind ourselves and our respective executors and administrators firmly by these presents.

The condition of this Bond is such that if the above bounden shall on his/her part fully and faithfully perform all of the terms of the Contract entered into between him/herself and the City of Madison for the construction of:

WEST STREETS LIGHTING RETROFIT-2013
CONTRACT NO. 6946

in Madison, Wisconsin, and shall pay all claims for labor performed and material furnished in the prosecution of said work, and save the City harmless from all claims for damages because of negligence in the prosecution of said work, and shall save harmless the said City from all claims for compensation (under Chapter 102, Wisconsin Statutes) of employees and employees of subcontractor, then this Bond is to be void, otherwise of full force, virtue and effect.

Signed and sealed this _____day of _____,

Countersigned:

_____
Company Name (Principal)

_____ _____
Witness President Seal

_____
Secretary

Approved as to form:

_____
Surety Seal
☐ Salary Employee ☐ Commission

_____ By _____
City Attorney Attorney-in-Fact

This certifies that I have been duly licensed as an agent for the above company in Wisconsin under License No. _____ for the year 20_____, and appointed as attorney-in-fact with authority to execute this payment and performance bond which power of attorney has not been revoked.

_____ _____
Date Agent

MINIMUM WAGE SCALE

FOR

PUBLIC WORKS IMPROVEMENTS

APPROVED BY: BOARD OF PUBLIC WORKS

MADISON, WISCONSIN

February 7, 2012

The attached "Prevailing Wage Rate Determination: (Pages 1 through 30), issued February 7, 2012, is hereby approved as the Minimum Wage Scale of the City of Madison.

State of Wisconsin Department of Workforce Development Equal Rights Division	**DEPARTMENTAL ORDER**

ISSUE DATE: 1/13/2012

PROJECT:

ALL PUBLIC WORKS PROJECTS UNDER SEC 66.0903, STATS.-CITY OF MADISON
MADISON CITY, DANE COUNTY, WI
Determination No. 201200105

PROJECT OWNER:	REQUESTER:
ROBERT F. PHILLIPS, CITY ENGINEER CITY OF MADISON-ENGINEERING 210 MARTIN L KING JR BLVD, RM 115 MADISON, WI 53703	ROBERT F. PHILLIPS, CITY ENGINEER CITY OF MADISON-ENGINEERING 210 MARTIN L KING JR BLVD, RM 115 MADISON, WI 53703
ADDITIONAL CONTACT:	
NORMAN DAVIS, CONTRACT COMPLIANCE CITY OF MADISON-DEPT OF CIVIL RTS-AA DIV 210 MARTIN L KING JR BLVD, RM 523 MADISON, WI 537033342	

The department received an application for prevailing wage rate determination for the above-captioned project. The department conducted a survey to determine the prevailing wage rate for the trade(s) or occupation(s) needed to complete the project. The survey's findings appear in the attached project determination.

If you believe that the wage rate for any trade or occupation does not accurately reflect the prevailing wage rate in the city, village or town where the project is located, you may ask the department to conduct an administrative review of such wage rate. You must submit this request in writing within 30 days from the date indicated above. Additionally, your request must include wage rate information from at least three similar projects in the city, village or town where the proposed project is located and on which some work has been performed by the contested trade(s) during the current survey period and was previously considered by the department in issuing the attached determination. See DWD 290.10 of the Wisconsin Administrative Code and either s. 66.0903(3)(br), s. 66.0904(4)(e), or s. 103.49(3)(c), Stats., for a complete explanation of the administrative review process.

Enclosures

It is hereby ordered that the prevailing wage rates set forth in the attached project determination shall only be applicable to the above referenced project. This order is a **FINAL ORDER** of the department unless a timely request for an administrative review is filed with the department.

ISSUED BY:

Equal Rights Division
Labor Standards Bureau
Construction Wage Standards Section
PO Box 8928 Madison, WI 53708-8928
(608)266-6861

Web Site: http://dwd.wisconsin.gov/er/

PREVAILING WAGE RATE DETERMINATION
Issued by the State of Wisconsin
Department of Workforce Development
Pursuant to s. 66.0903, Wis. Stats.
Issued On: 1/13/2012

DETERMINATION NUMBER:	201200105
EXPIRATION DATE:	Prime Contracts MUST Be Awarded or Negotiated On Or Before 12/31/2012. If NOT, You MUST Reapply.
PROJECT NAME:	ALL PUBLIC WORKS PROJECTS UNDER SEC 66.0903, STATS.-CITY OF MADISON
PROJECT LOCATION:	MADISON CITY, DANE COUNTY, WI
CONTRACTING AGENCY:	CITY OF MADISON-ENGINEERING

CLASSIFICATION:	Contractors are responsible for correctly classifying their workers. Either call the Department of Workforce Development (DWD) with trade or classification questions or consult DWD's Dictionary of Occupational Classifications & Work Descriptions on the DWD website at: dwd.wisconsin.gov/er/prevailing_wage_rate/Dictionary/dictionary_main.htm.
OVERTIME:	Time and one-half must be paid for all hours worked: - over 10 hours per day on prevailing wage projects - over 40 hours per calendar week - Saturday and Sunday - on all of the following holidays: January 1; the last Monday in May; July 4; the 1st Monday in September; the 4th Thursday in November; December 25; - The day before if January 1, July 4 or December 25 falls on a Saturday; - The day following if January 1, July 4 or December 25 falls on a Sunday. Apply the time and one-half overtime calculation to whichever is higher between the Hourly Basic Rate listed on this project determination or the employee's regular hourly rate of pay. Add any applicable Premium or DOT Premium to the Hourly Basic Rate before calculating overtime. A DOT Premium (discussed below) may supersede this time and one-half requirement.
FUTURE INCREASE:	When a specific trade or occupation requires a future increase, you MUST add the full hourly increase to the "TOTAL" on the effective date(s) indicated for the specific trade or occupation.
PREMIUM PAY:	If indicated for a specific trade or occupation, the full amount of such pay MUST be added to the "HOURLY BASIC RATE OF PAY" indicated for such trade or occupation, whevenever such pay is applicable.
DOT PREMIUM:	This premium only applies to highway and bridge projects owned by the Wisconsin Department of Transportation and to the project type heading "Airport Pavement or State Highway Construction." DO NOT apply the premium calculation under any other project type on this determination.
APPRENTICES:	Pay apprentices a percentage of the applicable journeyperson's hourly basic rate of pay and hourly fringe benefit contributions specified in this determination. Obtain the appropriate percentage from each apprentice's contract or indenture.
SUBJOURNEY:	Subjourney wage rates may be available for some of the trades or occupations indicated below with the exception of laborers, truck drivers and heavy equipment operators. Any employer interested in using a subjourney classification on this project MUST complete Form ERD-10880 and request the applicable wage rate from the Department of Workforce Development PRIOR to using the subjourney worker on this project.

This document **MUST BE POSTED** by the **CONTRACTING AGENCY** in at least one conspicuous and easily accessible place **on the site of the project** . A local governmental unit may post this document at the place normally used to post public notices if there is no common site on the project. This document **MUST** remain posted during the entire time any worker is employed on the project and **MUST** be physically incorporated into the specifications and all contracts and subcontracts. If you have any questions, please write to the Equal Rights Division, Labor Standards Bureau, P.O. Box 8928, Madison, Wisconsin 53708 or call (608) 266-6861.

The following statutory provisions apply to local governmental unit projects of public works and are set forth below pursuant to the requirements of s. 66.0903(8), Stats.

s. 66.0903 (1) (f) & s. 103.49 (1) (c) "PREVAILING HOURS OF LABOR" for any trade or occupation in any area means 10 hours per day and 40 hours per week and may not include any hours worked on a Saturday or Sunday or on any of the following holidays:

1. January 1.
2. The last Monday in May.
3. July 4.
4. The first Monday in September.
5. The 4th Thursday in November.
6. December 25.
7. The day before if January 1, July 4 or December 25 falls on a Saturday.
8. The day following if January 1, July 4 or December 25 falls on a Sunday.

s. 66.0903 (10) RECORDS; INSPECTION; ENFORCEMENT.
(a) Each contractor, subcontractor, or contractor's or subcontractor's agent performing work on a project of public works that is subject to this section shall keep full and accurate records clearly indicating the name and trade or occupation of every person performing the work described in sub. (4) and an accurate record of the number of hours worked by each of those persons and the actual wages paid for the hours worked.

s. 66.0903 (11) LIABILITY AND PENALTIES.
(a) 1. Any contractor, subcontractor, or contractor's or subcontractor's agent who fails to pay the prevailing wage rate determined by the department under sub. (3) or who pays less than 1.5 times the hourly basic rate of pay for all hours worked in excess of the prevailing hours of labor is liable to any affected employee in the amount of his or her unpaid wages or his or her unpaid overtime compensation and in an additional amount as liquidated damages as provided under subd. 2., 3., whichever is applicable.
2. If the department determines upon inspection under sub. (10) (b) or (c) that a contractor, subcontractor, or contractor's or subcontractor's agent has failed to pay the prevailing wage rate determined by the department under sub. (3) or has paid less than 1.5 times the hourly basic rate of pay for all hours worked in excess of the prevailing hours of labor, the department shall order the contractor to pay to any affected employee the amount of his or her unpaid wages or his or her unpaid overtime compensation and an additional amount equal to 100 percent of the amount of those unpaid wages or that unpaid overtime compensation as liquidated damages within a period specified by the department in the order.
3. In addition to or in lieu of recovering the liability specified in subd. 1. as provided in subd. 2., any employee for and in behalf of that employee and other employees similarly situated may commence an action to recover that liability in any court of competent jurisdiction. If the court finds that a contractor, subcontractor, or contractor's or subcontractor's agent has failed to pay the prevailing wage rate determined by the department under sub. (3) or has paid less than 1.5 times the hourly basic rate of pay for all hours worked in excess of the prevailing hours of labor, the court shall order the contractor, subcontractor, or agent to pay to any affected employee the amount of his or her unpaid wages or his or her unpaid overtime compensation and an additional amount equal to 100 percent of the amount of those unpaid wages or that unpaid overtime compensation as liquidated damages.
5. No employee may be a party plaintiff to an action under subd. 3. unless the employee consents in writing to become a party and the consent is filed in the court in which the action is brought. Notwithstanding s. 814.04 (1), the court shall, in addition to any judgment awarded to the plaintiff, allow reasonable attorney fees and costs to be paid by the defendant.

BUILDING OR HEAVY CONSTRUCTION

Includes sheltered enclosures with walk-in access for the purpose of housing persons, employees, machinery, equipment or supplies and non-sheltered work such as canals, dams, dikes, reservoirs, storage tanks, etc. A sheltered enclosure need not be "habitable" in order to be considered a building. The installation of machinery and/or equipment, both above and below grade level, does not change a project's character as a building. On-site grading, utility work and landscaping are included within this definition. Residential buildings of four (4) stories or less, agricultural buildings, parking lots and driveways are NOT included within this definition.

SKILLED TRADES

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
101	Acoustic Ceiling Tile Installer	29.06	15.16	44.22
102	Boilermaker	31.09	23.75	54.84
103	Bricklayer, Blocklayer or Stonemason Future Increase(s): Add $.50/hr on 6/1/2012; Add $ .80 on 6/1/2013 Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	32.26	16.60	48.86
104	Cabinet Installer	29.06	15.16	44.22
105	Carpenter	29.06	15.16	44.22
106	Carpet Layer or Soft Floor Coverer	29.06	15.16	44.22
107	Cement Finisher	32.03	15.13	47.16
108	Drywall Taper or Finisher	26.10	13.65	39.75
109	Electrician Future Increase(s): Add $.50/hr on 6/1/2012. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	32.55	18.68	51.23
110	Elevator Constructor	43.79	25.48	69.27
111	Fence Erector	25.50	0.26	25.76
112	Fire Sprinkler Fitter	36.39	16.75	53.14
113	Glazier	36.23	11.22	47.45
114	Heat or Frost Insulator	33.28	22.51	55.79
115	Insulator (Batt or Blown)	23.62	11.55	35.17
116	Ironworker	30.90	19.11	50.01
117	Lather	29.06	15.16	44.22

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
118	Line Constructor (Electrical)	35.97	18.08	54.05
119	Marble Finisher	31.16	16.27	47.43
120	Marble Mason	32.66	16.20	48.86
121	Metal Building Erector	22.00	4.11	26.11
122	Millwright	30.66	15.21	45.87
123	Overhead Door Installer	18.00	4.86	22.86
124	Painter	25.65	14.11	39.76
125	Pavement Marking Operator	26.00	0.00	26.00
126	Piledriver	29.56	15.16	44.72
127	Pipeline Fuser or Welder (Gas or Utility)	29.54	18.84	48.38
129	Plasterer	29.03	15.16	44.19
130	Plumber	36.20	15.02	51.22
132	Refrigeration Mechanic Future Increase(s): Add $.85/hr on 12/1/11; Add $.90/hr on 6/1/12; Add $.85/hr on 12/1/12.	40.35	16.21	56.56
133	Roofer or Waterproofer	28.06	0.00	28.06
134	Sheet Metal Worker	34.23	20.19	54.42
135	Steamfitter Future Increase(s): Add $.85/hr on 12/1/11; Add $.90/hr on 6/1/12; Add $.85/hr on 12/1/12.	40.35	16.21	56.56
137	Teledata Technician or Installer	21.26	6.99	28.25
138	Temperature Control Installer	32.55	18.68	51.23
139	Terrazzo Finisher	18.00	5.35	23.35
140	Terrazzo Mechanic	31.16	16.27	47.43
141	Tile Finisher Future Increase(s): Add $.50/hr on 6/1/2012; Add $ .80/hr on 6/1/2013.	23.77	16.00	39.77
142	Tile Setter Future Increase(s): Add $.50/hr on 6/1/2012; Add $ .80/hr on 6/1/2013.	29.71	16.00	45.71
143	Tuckpointer, Caulker or Cleaner	22.00	9.75	31.75
144	Underwater Diver (Except on Great Lakes)	36.20	18.81	55.01
146	Well Driller or Pump Installer	25.32	15.30	40.62

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
147	Siding Installer	16.74	2.58	19.32
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	32.37	16.48	48.85
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	28.78	15.16	43.94
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	17.80	9.00	26.80
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	23.38	12.48	35.86
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.30	10.97	32.27

TRUCK DRIVERS

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
201	Single Axle or Two Axle	18.00	6.98	24.98
203	Three or More Axle Future Increase(s): Add $1.57/hr on 6/1/2012.	18.00	13.83	31.83
204	Articulated, Euclid, Dumptor, Off Road Material Hauler Future Increase(s): Add $1/hr on 6/3/2012; Add $1/hr on 6/2/2013.	31.89	17.98	49.87
205	Pavement Marking Vehicle	19.25	10.84	30.09
207	Truck Mechanic	18.00	13.68	31.68

LABORERS

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
301	General Laborer Future Increase(s): Add $.50/hr. on 06/04/2012; Add $.75/hr. on 06/03/2013 Premium Increase(s): Add $1.00/hr for certified welder; Add $.25/hr for mason tender	24.14	13.45	37.59
302	Asbestos Abatement Worker	23.96	12.88	36.84
303	Landscaper	17.00	6.36	23.36
310	Gas or Utility Pipeline Laborer (Other Than Sewer and Water)	20.39	12.20	32.59
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	16.51	0.00	16.51
314	Railroad Track Laborer	14.00	4.77	18.77

HEAVY EQUIPMENT OPERATORS
SITE PREPARATION, UTILITY OR LANDSCAPING WORK ONLY

Fringe Benefits Must Be Paid On All Hours Worked

CODE	TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
501	Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Asphalt Milling Machine; Boring Machine (Directional, Horizontal or Vertical); Backhoe (Track Type) Having a Mfgr's Rated Capacity of 130,000 Lbs. or Over; Backhoe (Track Type) Having a Mfgr's Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Bulldozer or Endloader (Over 40 hp); Compactor (Self-Propelled 85 Ft Total Drum Width & Over, or Tractor Mounted, Towed & Light Equipment); Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Crane, Shovel, Dragline, Clamshells; Forklift (Machinery Moving or Steel Erection, 25 Ft & Over); Gradall (Cruz-Aire Type); Grader or Motor Patrol; Master Mechanic; Mechanic or Welder; Robotic Tool Carrier (With or Without Attachments); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Tractor (Scraper, Dozer, Pusher, Loader); Trencher (Wheel Type or Chain Type Having Over 8 Inch Bucket). Future Increase(s): Add $1/hr on 6/3/2012; Add $1/hr on 6/2/2013.	32.42	17.98	50.40
502	Backfiller; Broom or Sweeper; Bulldozer or Endloader (Under 40 hp); Environmental Burner; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Jeep Digger; Screed (Milling Machine); Skid Rig; Straddle Carrier or Travel Lift; Stump Chipper; Trencher (Wheel Type or Chain Type Having 8 Inch Bucket & Under).	31.89	14.44	46.33
503	Air Compressor (&/or 400 CFM or Over); Augers (Vertical & Horizontal); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Crusher, Screening or Wash Plant; Farm or Industrial Type Tractor; Forklift; Generator (&/or 150 KW or Over); Greaser; High Pressure Utility Locating Machine (Daylighting Machine); Mulcher; Oiler; Post Hole Digger or Driver; Pump (3 Inch or Over) or Well Points; Refrigeration Plant or Freeze Machine; Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack. Future Increase(s): Add $1/hr on 6/3/2012; Add $1/hr on 6/2/2013.	31.89	17.98	49.87
504	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	36.20	18.81	55.01
505	Work Performed on the Great Lakes Including Crane or Backhoe Operator; Assistant Hydraulic Dredge Engineer; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder; 70 Ton & Over Tug Operator. Premium Increase(s): Add $.50/hr for friction crane, lattice boom or crane certification (CCO).	37.45	19.45	56.90

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
506	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or More); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	26.80	18.52	45.32
507	Work Performed on the Great Lakes Including Deck Equipment Operator, Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under); Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY.	27.75	19.15	46.90

HEAVY EQUIPMENT OPERATORS
EXCLUDING SITE PREPARATION, UTILITY, PAVING LANDSCAPING WORK

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
508	Boring Machine (Directional); Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic. Future Increase(s): Add $1/hr on 6/3/2012; Add $1/hr on 6/2/2013. Premium Increase(s): Add $.50/hr at 200 ton: Add $1.00/hr. at 300 ton; Add $1.50/hr at 400 ton; Add $2.00/hr at 500 ton.	34.62	17.98	52.60
509	Backhoe (Track Type) Having a Mfgr's Rated Capacity of 130,000 Lbs. or Over; Boring Machine (Horizontal or Vertical); Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With A Lifting Capacity Of 4,000 Lbs. & Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Pile Driver; Versi Lifts, Tri-Lifts & Gantrys (20,000 Lbs. & Over). Future Increase(s): Add $1/hr on 6/3/2012; Add $1/hr on 6/2/2013. Premium Increase(s): Add $.25/hr for cranes with lifting capacity of 45 ton or over.	33.62	17.98	51.60
510	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump (Over 46 Meter), Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Concrete Spreader & Distributor; Dredge (NOT Performing Work on the Great Lakes); Forklift (Machinery Moving or Steel Erection, 25 Ft & Over); Gradall (Cruz-Aire Type); Hydro-Blaster (10,000 PSI or Over); Milling Machine; Skid Rig; Traveling Crane (Bridge Type). Future Increase(s): Add $1/hr on 6/3/2012; Add $1/hr on 6/2/2013.	32.42	17.98	50.40

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
511	Air, Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Bulldozer or Endloader (Over 40 hp); Compactor (Self-Propelled 85 Ft Total Drum Width & Over, or Tractor Mounted, Towed & Light Equipment); Concrete Pump (46 Meter & Under), Concrete Conveyor (Rotec or Bidwell Type); Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Environmental Burner; Gantrys (Under 20,000 Lbs.); Grader or Motor Patrol; High Pressure Utility Locating Machine (Daylighting Machine); Manhoist; Material or Stack Hoist; Mechanic or Welder; Railroad Track Rail Leveling Machine, Tie Placer, Extractor, Tamper, Stone Leveler or Rehabilitation Equipment; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yd or More Capacity; Screed (Milling Machine); Sideboom; Straddle Carrier or Travel Lift; Tining or Curing Machine; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Trencher (Wheel Type or Chain Type Having Over 8-Inch Bucket). Future Increase(s): Add $1/hr on 6/3/2012; Add $1/hr on 6/2/2013.	31.89	17.98	49.87
512	Backfiller; Broom or Sweeper; Bulldozer or Endloader (Under 40 hp); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Conveyor System; Concrete Finishing Machine (Road Type); Fireman (Pile Driver & Derrick NOT Performing Work on the Great Lakes); Grout Pump; Hoist (Tugger, Automatic); Industrial Locomotives; Jeep Digger; Lift Slab Machine; Mulcher; Robotic Tool Carrier (With or Without Attachments); Roller (Rubber Tire, 5 Ton or Under); Screw or Gypsum Pumps; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Stump Chipper; Trencher (Wheel Type or Chain Type Having 8-Inch Bucket & Under); Winches & A-Frames.	35.59	19.10	54.69
513	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Boatmen (NOT Performing Work on the Great Lakes); Boiler (Temporary Heat); Crusher, Screening or Wash Plant; Elevator; Farm or Industrial Type Tractor; Fireman (Asphalt Plant NOT Performing Work on the Great Lakes); Forklift; Generator (&/or 150 KW or Over); Greaser; Heaters (Mechanical); Loading Machine (Conveyor); Oiler; Post Hole Digger or Driver; Prestress Machine; Pump (3 Inch or Over) or Well Points; Refrigeration Plant or Freeze Machine; Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack. Future Increase(s): Add $1/hr on 6/3/2012; Add $1/hr on 6/2/2013.	29.19	17.98	47.17
514	Gas or Utility Pipeline, Except Sewer & Water (Primary Equipment). Future Increase(s): Add $2/hr. on 1/1/2013.	34.89	19.68	54.57
515	Gas or Utility Pipeline, Except Sewer & Water (Secondary Equipment).	30.32	17.40	47.72
516	Fiber Optic Cable Equipment	22.00	7.27	29.27

SEWER, WATER OR TUNNEL CONSTRUCTION

Includes those projects that primarily involve public sewer or water distribution, transmission or collection systems and related tunnel work (excluding buildings).

SKILLED TRADES

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
103	Bricklayer, Blocklayer or Stonemason	32.66	16.20	48.86
105	Carpenter Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	33.43	19.31	52.74
107	Cement Finisher Future Increase(s): Add $1.86 on 6/1/12; Add $1.87 on 6/1/13; Add $1.87 on 6/1/14; Add $1.87 on 6/1/15; Add $1.75 on 6/1/16. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.40/hr when the Wisconsin Department of Transportation or responsible governing agency requires that work be performed at night under artificial illumination with traffic control and the work is completed after sunset and before sunrise.	30.68	15.68	46.36
109	Electrician Future Increase(s): Add $1.40/hr on 6/1/2012. Add $1.60/hr on 6/1/2013. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	31.54	20.95	52.49
111	Fence Erector	25.50	0.26	25.76
116	Ironworker Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	31.31	22.22	53.53
118	Line Constructor (Electrical)	35.97	18.08	54.05
125	Pavement Marking Operator	26.00	0.00	26.00
126	Piledriver	29.56	15.16	44.72
130	Plumber	36.20	15.02	51.22
135	Steamfitter	39.90	15.76	55.66
137	Teledata Technician or Installer	21.26	6.99	28.25

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
143	Tuckpointer, Caulker or Cleaner	22.00	9.75	31.75
144	Underwater Diver (Except on Great Lakes)	36.20	18.81	55.01
146	Well Driller or Pump Installer	24.22	14.80	39.02
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	32.37	16.48	48.85
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	28.78	15.16	43.94
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	17.80	9.00	26.80
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	23.38	12.48	35.86
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.30	10.97	32.27

TRUCK DRIVERS

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
201	Single Axle or Two Axle	23.00	8.64	31.64
203	Three or More Axle	21.17	9.51	30.68
204	Articulated, Euclid, Dumptor, Off Road Material Hauler Future Increase(s): Add $1.75/hr on 6/1/2012; Add $1.85/hr on 6/1/2013. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	22.50	16.19	38.69
205	Pavement Marking Vehicle	19.25	10.84	30.09
207	Truck Mechanic	21.17	9.51	30.68

LABORERS

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
301	General Laborer Future Increase(s): Add $.70/hr. on 06/04/2012; Add $.80/hr. on 06/03/2013 Premium Increase(s): Add $.20 for blaster, bracer, manhole builder, caulker, bottomman and power tool; Add $.55 for pipelayer; Add $1.00 for tunnel work 0-15 lbs. compressed air; Add $2.00 for over 15-30 lbs. compressed air; Add $3.00 for over 30 lbs. compressed air.	25.28	13.44	38.72

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
303	Landscaper	17.00	6.36	23.36
304	Flagperson or Traffic Control Person	12.00	17.89	29.89
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	16.51	0.00	16.51
314	Railroad Track Laborer	14.00	4.77	18.77

HEAVY EQUIPMENT OPERATORS
SEWER, WATER OR TUNNEL WORK

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
521	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity Of Over 4,000 Lbs., Crane With Boom Dollies; Master Mechanic; Pile Driver. Future Increase(s): Add $1/hr on 6/3/2012; Add $1/hr on 6/2/2013. Premium Increase(s): Add $.25/hr for cranes with lifting capacity of 45 ton or over.	33.62	17.98	51.60
522	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Boring Machine (Directional); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump (Over 46 Meter), Concrete Conveyor (Rotec or Bidwell Type); Concrete Spreader & Distributor; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity of 4,000 Lbs. & Under; Dredge (NOT Performing Work on the Great Lakes); Milling Machine; Skid Rig; Telehandler; Traveling Crane (Bridge Type). Future Increase(s): Add $1/hr on 6/3/2012; Add $1/hr on 6/2/2013.	32.42	17.98	50.40

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
523	Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Boring Machine (Horizontal or Vertical); Bulldozer or Endloader (Over 40 hp); Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Concrete Pump (46 Meter & Under), Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Gradall (Cruz-Alre Type); Grader or Motor Patrol; Hydro-Blaster (10,000 PSI or Over); Manhoist; Material or Stack Hoist; Mechanic or Welder; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yd or More Capacity; Screed (Milling Machine); Sideboom; Straddle Carrier or Travel Lift; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Trencher (Wheel Type or Chain Type Having Over 8-Inch Bucket). Future Increase(s): Add $1/hr on 6/3/2012; Add $1/hr on 6/2/2013.	31.89	17.98	49.87
524	Backfiller; Broom or Sweeper; Bulldozer or Endloader (Under 40 hp); Compactor (Self-Propelled 85 Ft Total Drum Width & Over, or Tractor Mounted, Towed & Light Equipment); Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Conveyor System; Concrete Finishing Machine (Road Type); Environmental Burner; Fireman (Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Hoist (Tugger, Automatic); Grout Pump; Jeep Digger; Lift Slab Machine; Mulcher; Power Subgrader; Pump (3 Inch or Over) or Well Points; Robotic Tool Carrier (With or Without Attachments); Roller (Rubber Tire, 5 Ton or Under); Screw or Gypsum Pumps; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Stump Chipper; Tining or Curing Machine; Trencher (Wheel Type or Chain Type Having 8-Inch Bucket & Under); Winches & A-Frames.	30.89	17.16	48.05
525	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Crusher, Screening or Wash Plant; Farm or Industrial Type Tractor; Fireman (Asphalt Plant NOT Performing Work on the Great Lakes); Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Loading Machine (Conveyor); Post Hole Digger or Driver; Refrigeration Plant or Freeze Machine; Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack. Future Increase(s): Add $1/hr on 6/3/2012; Add $1/hr on 6/2/2013.	29.19	17.98	47.17
526	Boiler (Temporary Heat); Forklift; Greaser; Oiler.	29.19	17.96	47.15
527	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	36.20	18.81	55.01
528	Work Performed on the Great Lakes Including 70 Ton & Over Tug Operator; Assistant Hydraulic Dredge Engineer; Crane or Backhoe Operator; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder.	36.20	18.81	55.01

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
529	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or More); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	26.80	18.52	45.32
530	Work Performed on the Great Lakes Including Deck Equipment Operator; Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under), Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY.	26.80	18.52	45.32

AIRPORT PAVEMENT OR STATE HIGHWAY CONSTRUCTION

Includes all airport projects (excluding buildings) and all projects awarded by the Wisconsin Department of Transportation (excluding buildings).

SKILLED TRADES

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
103	Bricklayer, Blocklayer or Stonemason	32.66	15.92	48.58
105	Carpenter	30.23	15.16	45.39
107	Cement Finisher Future Increase(s): Add $1.86 on 6/1/12; Add $1.87 on 6/1/13; Add $1.87 on 6/1/14; Add $1.87 on 6/1/15; Add $1.75 on 6/1/16. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.40/hr when the Wisconsin Department of Transportation or responsible governing agency requires that work be performed at night under artificial illumination with traffic control and the work is completed after sunset and before sunrise.	30.68	15.68	46.36
109	Electrician	37.25	14.68	51.93
111	Fence Erector	35.62	0.00	35.62
116	Ironworker	30.90	19.11	50.01
118	Line Constructor (Electrical)	35.97	18.08	54.05
124	Painter	28.00	11.15	39.15
125	Pavement Marking Operator	26.65	14.92	41.57
126	Piledriver	29.56	15.16	44.72
133	Roofer or Waterproofer	28.06	0.00	28.06
137	Teledata Technician or Installer	21.26	6.99	28.25
143	Tuckpointer, Caulker or Cleaner	22.00	9.75	31.75
144	Underwater Diver (Except on Great Lakes)	36.20	18.81	55.01
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	35.42	12.90	48.32
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	35.50	14.27	49.77
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	25.18	14.07	39.25
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	23.38	12.48	35.86

154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.30	10.97	32.27

TRUCK DRIVERS

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
201	Single Axle or Two Axle Future Increase(s): Add $1.75/hr on 6/1/2012; Add $1.85/hr on 6/1/2013. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	22.35	16.19	38.54
203	Three or More Axle Future Increase(s): Add $1.75/hr on 6/1/2012; Add $1.85/hr on 6/1/2013. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	22.50	16.19	38.69
204	Articulated, Euclid, Dumptor, Off Road Material Hauler	24.91	15.63	40.54
205	Pavement Marking Vehicle	23.84	14.76	38.60
206	Shadow or Pilot Vehicle	24.76	15.35	40.11
207	Truck Mechanic	24.91	15.35	40.26

LABORERS

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
301	General Laborer Future Increase(s): Add $1.60/hr on 6/1/2012: Add $1.70/hr on 6/1/2013; Add $1.60/hr on 6/1/2014. Premium Increase(s): Add $.10/hr for topman, air tool operator, vibrator or tamper operator (mechanical hand operated), chain saw operator and demolition burning torch laborer; Add $.15/hr for bituminous worker (raker and luteman), formsetter (curb, sidewalk and pavement) and strike off man; Add $.20/hr for blaster and powderman; Add $.25/hr for bottomman; Add $.35/hr for line and grade specialist; Add $.45/hr for pipelayer. / DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	27.20	13.45	40.65
302	Asbestos Abatement Worker	23.96	12.88	36.84
303	Landscaper Future Increase(s): Add $1.60/hr on 6/1/12; Add $1.70/hr on 6/1/13; Add $1.60/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	27.20	13.45	40.65
304	Flagperson or Traffic Control Person Future Increase(s): Add $1.60/hr on 6/1/2012; Add $1.70/hr on 6/1/2013; Add $1.60/hr on 6/1/2014. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr when the Wisconsin Department of Transportation or responsible governing agency requires that work be performed at night under artificial illumination with traffic control and the work is completed after sunset and before sunrise.	23.55	13.45	37.00

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	16.51	0.00	16.51
314	Railroad Track Laborer	14.00	4.77	18.77

HEAVY EQUIPMENT OPERATORS
AIRPORT PAVEMENT OR STATE HIGHWAY CONSTRUCTION

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
531	Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity Of Over 4,000 Lbs., Crane With Boom Dollies; Traveling Crane (Bridge Type). Future Increase(s): Add $2/hr on 6/1/12; Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	34.22	18.90	53.12
532	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With A Lifting Capacity Of 4,000 Lbs., & Under; Dredge (NOT Performing Work on the Great Lakes); Licensed Boat Pilot (NOT Performing Work on the Great Lakes); Pile Driver. Future Increase(s): Add $2/hr on 6/1/12; Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	33.72	18.90	52.62

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
533	Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Asphalt Heater, Planer & Scarifier; Asphalt Milling Machine; Asphalt Screed; Automatic Subgrader (Concrete); Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Bituminous (Asphalt) Plant & Paver, Screed; Boatmen (NOT Performing Work on the Great Lakes); Boring Machine (Directional, Horizontal or Vertical); Bridge (Bidwell) Paver; Bulldozer or Endloader; Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Conveyor System; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump, Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Concrete Spreader & Distributor; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane With a Lifting Capacity of 25 Tons or Under; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Grout Pump; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Material or Stack Hoist; Mechanic or Welder; Milling Machine; Post Hole Digger or Driver; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Sideboom; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Straddle Carrier or Travel Lift; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Trencher (Wheel Type or Chain Type); Tube Finisher; Tugger (NOT Performing Work on the Great Lakes); Winches & A-Frames. Future Increase(s): Add $2/hr on 6/1/12; Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	33.22	18.90	52.12

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
534	Belting, Burlap, Texturing Machine; Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed & Light Equipment); Concrete Finishing Machine (Road Type); Environmental Burner; Farm or Industrial Type Tractor; Fireman (Asphalt Plant, Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forklift; Greaser; Hoist (Tugger, Automatic); Jeep Digger; Joint Sawer (Multiple Blade); Launch (NOT Performing Work on the Great Lakes); Lift Slab Machine; Mechanical Float; Mulcher; Power Subgrader; Robotic Tool Carrier (With or Without Attachments); Roller (Rubber Tire, 5 Ton or Under); Self Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or Without Attachments); Telehandler; Tining or Curing Machine. Future Increase(s): Add $2/hr on 6/1/12; Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	32.96	18.90	51.86
535	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Automatic Belt Conveyor & Surge Bin; Boiler (Temporary Heat); Concrete Proportioning Plant; Crusher, Screening or Wash Plant; Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Mudjack; Oiler; Prestress Machine; Pug Mill; Pump (3 Inch or Over) or Well Points; Rock, Stone Breaker; Screed (Milling Machine); Stump Chipper; Tank Car Heaters; Vibratory Hammer or Extractor, Power Pack. Future Increase(s): Add $2/hr on 6/1/12; Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	32.67	18.90	51.57
536	Fiber Optic Cable Equipment.	22.00	7.27	29.27
537	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	36.20	18.81	55.01

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
538	Work Performed on the Great Lakes Including 70 Ton & Over Tug Operator; Assistant Hydraulic Dredge Engineer; Crane or Backhoe Operator; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder.	36.20	18.81	55.01
539	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or More); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	26.80	18.52	45.32
540	Work Performed on the Great Lakes Including Deck Equipment Operator, Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under); Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks-Great Lakes ONLY.	26.80	18.52	45.32

LOCAL STREET OR MISCELLANEOUS PAVING CONSTRUCTION

Includes roads, streets, alleys, trails, bridges, paths, racetracks, parking lots and driveways (except residential or agricultural), public sidewalks or other similar projects (excluding projects awarded by the Wisconsin Department of Transportation).

SKILLED TRADES

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
103	Bricklayer, Blocklayer or Stonemason	32.66	16.20	48.86
105	Carpenter	29.06	15.16	44.22
107	Cement Finisher Future Increase(s): Add $1.86 on 6/1/12; Add $1.87 on 6/1/13; Add $1.87 on 6/1/14; Add $1.87 on 6/1/15; Add $1.75 on 6/1/16. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.40/hr when the Wisconsin Department of Transportation or responsible governing agency requires that work be performed at night under artificial illumination with traffic control and the work is completed after sunset and before sunrise.	30.68	15.68	46.36
109	Electrician Future Increase(s): Add $.50/hr. effective 06/04/2012. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	28.74	17.86	46.60
111	Fence Erector	25.50	0.26	25.76
116	Ironworker	30.90	19.11	50.01
118	Line Constructor (Electrical)	35.97	18.08	54.05
124	Painter	25.65	14.11	39.76
125	Pavement Marking Operator	26.00	0.00	26.00
126	Piledriver	29.56	15.16	44.72
133	Roofer or Waterproofer	28.06	0.00	28.06
137	Teledata Technician or Installer	21.26	6.99	28.25
143	Tuckpointer, Caulker or Cleaner	22.00	9.75	31.75
144	Underwater Diver (Except on Great Lakes)	36.20	18.81	55.01
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	35.42	12.90	48.32

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	29.64	14.64	44.28
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	25.18	13.07	38.25
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	23.38	12.48	35.86
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.30	10.97	32.27

TRUCK DRIVERS

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
201	Single Axle or Two Axle	15.00	0.00	15.00
203	Three or More Axle	19.50	4.97	24.47
204	Articulated, Euclid, Dumptor, Off Road Material Hauler Future Increase(s): Add $1/hr on 6/3/2012; Add $1/hr on 6/2/2013.	31.89	17.98	49.87
205	Pavement Marking Vehicle	19.25	10.84	30.09
206	Shadow or Pilot Vehicle	15.00	0.00	15.00
207	Truck Mechanic	19.50	4.97	24.47

LABORERS

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
301	General Laborer	26.15	12.29	38.44
303	Landscaper	23.71	15.07	38.78
304	Flagperson or Traffic Control Person	12.00	17.89	29.89
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	16.51	0.00	16.51
314	Railroad Track Laborer	14.00	4.77	18.77

HEAVY EQUIPMENT OPERATORS
CONCRETE PAVEMENT OR BRIDGE WORK

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
541	Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity Of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic. Future Increase(s): Add $2/hr on 6/1/12; Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	34.22	18.90	53.12
542	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity of 4,000 Lbs. & Under; Crane, Tower Crane Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Dredge (NOT Performing Work on the Great Lakes); Licensed Boat Pilot (NOT Performing Work on the Great Lakes); Pile Driver. Future Increase(s): Add $2/hr on 6/1/12; Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	33.72	18.90	52.62

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
543	Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Automatic Subgrader (Concrete); Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Boring Machine (Directional, Horizontal or Vertical); Bridge (Bidwell) Paver; Bulldozer or Endloader; Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Conveyor System; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump, Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Concrete Spreader & Distributor; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane With a Lifting Capacity of 25 Tons or Under; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Grout Pump; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Manhoist; Material or Stack Hoist; Mechanic or Welder; Milling Machine; Post Hole Digger or Driver; Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Sideboom; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Straddle Carrier or Travel Lift; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Trencher (Wheel Type or Chain Type); Tube Finisher; Tugger (NOT Performing Work on the Great Lakes); Winches & A-Frames. Future Increase(s): Add $2/hr on 6/1/12; Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	33.22	18.90	52.12

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
544	Backfiller; Belting, Burlap, Texturing Machine; Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed & Light Equipment); Concrete Finishing Machine (Road Type); Environmental Burner; Farm or Industrial Type Tractor; Fireman (Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forklift; Greaser; Jeep Digger; Joint Sawer (Multiple Blade); Launch (NOT Performing Work on the Great Lakes); Lift Slab Machine; Mechanical Float; Mulcher; Power Subgrader; Robotic Tool Carrier (With or Without Attachments); Self Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or Without Attachments); Telehandler; Tining or Curing Machine. Future Increase(s): Add $2/hr on 6/1/12; Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	33.22	18.90	52.12
545	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Automatic Belt Conveyor & Surge Bin; Boiler (Temporary Heat); Concrete Proportioning Plant; Crusher, Screening or Wash Plant; Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Mudjack; Oiler; Prestress Machine; Pug Mill; Pump (3 Inch or Over) or Well Points; Rock, Stone Breaker; Screed (Milling Machine); Stump Chipper; Tank Car Heaters; Vibratory Hammer or Extractor, Power Pack.	30.42	17.58	48.00
546	Fiber Optic Cable Equipment.	22.00	7.27	29.27
547	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	36.20	18.81	55.01
548	Work Performed on the Great Lakes Including 70 Ton & Over Tug Operator; Assistant Hydraulic Dredge Engineer; Crane or Backhoe Operator; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder.	36.20	18.81	55.01
549	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or more); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	26.80	18.52	45.32
550	Work Performed on the Great Lakes Including Deck Equipment Operator; Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under); Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY.	26.80	18.52	45.32

HEAVY EQUIPMENT OPERATORS
ASPHALT PAVEMENT OR OTHER WORK

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
551	Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self Erecting Tower Crane With a Lifting Capacity of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads and/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic.	34.62	17.96	52.58
552	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity Of 4,000 Lbs. & Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Dredge (NOT Performing Work on the Great Lakes); Licensed Boat Pilot (NOT Performing Work on the Great Lakes); Pile Driver. Future Increase(s): Add $2/hr on 6/1/12; Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	33.72	18.90	52.62

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
553	Air, Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Asphalt Heater, Planer & Scarifier; Asphalt Milling Machine; Asphalt Screed; Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Bituminous (Asphalt) Plant & Paver, Screed; Boring Machine (Directional, Horizontal or Vertical); Bulldozer or Endloader; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Conveyor System; Concrete Laser/Screed; Concrete Slipform Placer Curb & Gutter Machine; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane With a Lifting Capacity of 25 Tons or Under; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Manhoist; Material or Stack Hoist; Mechanic or Welder; Milling Machine; Post Hole Digger or Driver; Railroad Track Rail Leveling Machine, Tie Placer, Extractor, Tamper, Stone Leveler or Rehabilitation Equipment; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Sideboom; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Trencher (Wheel Type or Chain Type); Tube Finisher; Tugger (NOT Performing Work on the Great Lakes); Winches & A-Frames. Future Increase(s): Add $2/hr on 6/1/12; Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14.	32.67	18.55	51.22
554	Backfiller; Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed & Light Equipment); Concrete Finishing Machine (Road Type); Environmental Burner; Farm or Industrial Type Tractor; Fireman (Asphalt Plant, Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forklift; Greaser; Hoist (Tugger, Automatic); Jeep Digger; Joint Sawer (Multiple Blade); Launch (NOT Performing Work on the Great Lakes); Lift Slab Machine; Mechanical Float; Mulcher; Power Subgrader; Robotic Tool Carrier (With or Without Attachments); Roller (Rubber Tire, 5 Ton or Under); Self-Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or Without Attachments); Telehandler.	31.52	17.89	49.41
555	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Automatic Belt Conveyor & Surge Bin; Boiler (Temporary Heat); Crusher, Screening or Wash Plant; Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Mudjack; Oiler; Prestress Machine; Pug Mill; Pump (3 Inch or Over) or Well Points; Rock, Stone Breaker; Screed (Milling Machine); Stump Chipper; Tank Car Heaters; Vibratory Hammer or Extractor, Power Pack. Future Increase(s): Add $2/hr on 6/1/12; Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14.	32.67	18.55	51.22
556	Fiber Optic Cable Equipment.	22.00	7.27	29.27

RESIDENTIAL OR AGRICULTURAL CONSTRUCTION

Includes single family houses or apartment buildings of no more than four (4) stories in height and all buildings, structures or facilities that are primarily used for agricultural or farming purposes, excluding commercial buildings. For classification purposes, the exterior height of a residential building, in terms of stories, is the primary consideration. All incidental items such as site work, driveways, parking lots, private sidewalks, private septic systems or sewer and water laterals connected to a public system and swimming pools are included within this definition. Residential buildings of five (5) stories and above are NOT included within this definition.

SKILLED TRADES

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
101	Acoustic Ceiling Tile Installer	27.00	2.47	29.47
102	Boilermaker	31.09	23.75	54.84
103	Bricklayer, Blocklayer or Stonemason	32.00	3.00	35.00
104	Cabinet Installer	22.00	2.74	24.74
105	Carpenter	27.00	3.46	30.46
106	Carpet Layer or Soft Floor Coverer	23.95	2.78	26.73
107	Cement Finisher	21.33	4.25	25.58
108	Drywall Taper or Finisher	23.80	1.55	25.35
109	Electrician	22.00	9.18	31.18
110	Elevator Constructor	43.79	25.48	69.27
111	Fence Erector	17.64	4.33	21.97
112	Fire Sprinkler Fitter	36.39	16.97	53.36
113	Glazier	36.23	11.22	47.45
114	Heat or Frost Insulator	29.04	19.73	48.77
115	Insulator (Batt or Blown)	18.95	1.70	20.65
116	Ironworker	30.90	19.11	50.01
117	Lather	28.15	15.14	43.29
119	Marble Finisher	31.16	16.27	47.43
120	Marble Mason	32.66	16.20	48.86
121	Metal Building Erector	17.50	2.80	20.30
123	Overhead Door Installer	17.00	0.00	17.00
124	Painter	25.65	6.33	31.98
125	Pavement Marking Operator	26.00	0.00	26.00

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
129	Plasterer	19.00	0.29	19.29
130	Plumber	30.00	10.34	40.34
132	Refrigeration Mechanic	30.96	0.00	30.96
133	Roofer or Waterproofer	29.85	1.55	31.40
134	Sheet Metal Worker	21.03	3.40	24.43
135	Steamfitter	32.59	11.05	43.64
137	Teledata Technician or Installer	19.23	5.32	24.55
138	Temperature Control Installer	22.45	4.11	26.56
139	Terrazzo Finisher	18.00	5.35	23.35
140	Terrazzo Mechanic	31.16	16.27	47.43
141	Tile Finisher	23.96	13.36	37.32
142	Tile Setter	21.00	0.00	21.00
143	Tuckpointer, Caulker or Cleaner	23.96	12.88	36.84
146	Well Driller or Pump Installer	15.10	12.38	27.48
147	Siding Installer	18.80	1.42	20.22

TRUCK DRIVERS

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
201	Single Axle or Two Axle	19.86	2.54	22.40
203	Three or More Axle	19.50	14.27	33.77
205	Pavement Marking Vehicle	19.25	10.84	30.09
207	Truck Mechanic	19.00	1.75	20.75

LABORERS

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
301	General Laborer	16.09	7.18	23.27
302	Asbestos Abatement Worker	17.00	2.21	19.21
303	Landscaper	25.00	0.54	25.54

311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	16.51	0.00	16.51

HEAVY EQUIPMENT OPERATORS
RESIDENTIAL OR AGRICULTURAL CONSTRUCTION

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
557	Asphalt Heater, Planer & Scarifier; Asphalt Milling Machine; Asphalt Screed; Backhoe (Track Type); Backhoe (Mini, 15,000 Lbs. & Under); Bituminous (Asphalt) Plant & Paver, Screed; Boring Machine (Directional, Horizontal or Vertical); Bulldozer or Endloader; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Conveyor System; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump, Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Concrete Spreader & Distributor; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane With a Lifting Capacity of 25 Tons or Under; Crane, Shovel, Dragline, Clamshells; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Grader or Motor Patrol; Grout Pump; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Manhoist; Material or Stack Hoist; Mechanic or Welder; Milling Machine; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Trencher (Wheel Type or Chain Type); Winches & A-Frames.	29.45	15.37	44.82
558	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Backfiller; Belting, Burlap, Texturing Machine; Boiler (Temporary Heat); Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed & Light Equipment); Concrete Finishing Machine (Road Type); Farm or Industrial Type Tractor; Forklift; Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Jeep Digger; Lift Slab Machine; Mulcher; Oiler; Post Hole Digger or Driver; Power Subgrader; Pump (3 Inch or Over) or Well Points; Robotic Tool Carrier (With or Without Attachments); Rock, Stone Breaker; Roller (Rubber Tire, 5 Tons or Under); Screed (Milling Machine); Self Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or Without Attachments); Stump Chipper; Telehandler; Vibratory Hammer or Extractor, Power Pack.	26.45	14.35	40.80

********** END OF RATES **********