OMAHA RAPID BUS TRANSIT STATION CANOPY PACKAGE

Project Number NE-79-X001

Request for Proposal Documents

Prepared by: AECOM
60580716

7/27/2018

Transit Authority of the City of Omaha, d/b/a/ Metro
2222 Cuming Street
Omaha, NE 68102

PROJECT: Omaha Rapid Bus Transit Station Canopy Package
PROJECT#: NE-79-X001

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RFP SOLICITATION

NOTICE OF REQUEST FOR PROPOSALS (RFP)

OMAHA RAPID BUS TRANSIT (ORBT) STATION CANOPY PACKAGE
VARIOUS LOCATIONS ALONG NICHOLAS STREET, DODGE STREET, AND DOUGLAS STREET, OMAHA, NE
PROJECT #: NE-79-X001
("Project")

The Transit Authority of the City of Omaha, d/b/a Metro ("**Metro"**) is requesting proposals from qualified responsible contractors for the performance of Work (as defined in Project Manual) in conformity with the Contract Documents (as defined in the Project Manual). Metro will receive sealed proposals for that purpose, until **August 28th, 2:00 p.m** Central Time, ("**Submission Deadline**"). Proposals not received by Metro as of the Submission Deadline will not be considered responsive and will not be opened. Proposals not meeting specified delivery and methods of submittal will not be considered responsive and will not be opened. Metro reserves the right to extend the Submission Deadline by issuing an Addendum.

Proposers shall refer to the RFP Documents for detailed deliverables. For this Proposal, there are various elements and products associated with the Scope of Work. Metro's intent is to select Proposers for consideration of awarded contract who demonstrate qualified and affirmed production capabilities and resources, staffing, scheduling and "just in time" delivery capabilities for the station canopies and all associated equipment and work to be provided for the Scope of Work.

Prospective Proposers are hereby advised that the work includes but is not limited to:

- Fabricated structural steel columns, roof beams, brackets, and edge beams.
- Facias with gutter and recessed lighting
- Downspouts
- Roof Glazing and Wind Screens
- Wall pack lighting, custom luminaire, and lights on station name sign
- Station name sign on signage pillar/canopy, decal on the wind screens, and aluminum logo on the canopy and signage pillar
- Wiring above the foundations for power distribution and data
- Provide anchor bolts for the shelter building and wind screens for construction by a separate contractor of site work
- Emergency phones
- Installation of next bus signs, ticket vending machines, and cameras (owner-furnished)

The current forms of the RFP and all issued Addenda are available for inspection at Metro's Administrative Offices located at 2222 Cuming Street in Omaha, Nebraska ("**Administrative Offices**") and online at the following links http://www.standardshare.com and www.ometro.com. Metro reserves the right to modify all or any of the same at any time prior to the Submission Deadline through an Addendum.

Proposals are subject to all terms, conditions, and provisions of this document, including Affirmative Action and Equal Employment Opportunity regulations. Proposers shall read and understand the requirements of this RFP.

The requirements of 49 Code of Federal Regulations (CFR) Part 26 applies to the Contract. It is the policy of Metro to practice nondiscrimination based on race, color, sex, or national origin in the award or performance of the Contract. Metro encourages participation under this solicitation by all qualifying and responsible firms regardless of business size or ownership, whether as the prime contractor or a subcontractor. There is no established Disadvantaged Business Enterprise participation goal for the Contract but participation is highly encouraged.

A Pre-Proposal conference will be held **Wednesday, August 8th at 2:00 p.m.** Central Time in Metro's Administrative Offices Board Room located at 2222 Cuming Street, Omaha, NE 68102. This pre-proposal is not mandatory but contractors are encouraged to attend.

All proposals must be made in the form and on the forms (and contain all certificates, documentation and information) required by the RFP Documents and must be accompanied by RFP security in the amount and on forms required thereby. Any proposal that does not fully comply with any requirement of the RFP Documents will be considered non-responsive, and Metro shall be entitled to reject any such proposal at any time. Metro reserves the right to waive any minor informality or mere irregularity contained in any proposal.

No proposal will be construed to be binding on Metro unless (i) a Contract first has been awarded by its Board of Directors at a public meeting, (ii) the Contract has been duly executed by each of the Contractor and Metro, and (iii) all conditions applicable to such award of the Contract and as otherwise may be set forth in the Contract Documents have been fully satisfied.

Proposals must be received with all required submittals as stated in the RFP, no later than August 28th, 2018 at 2:00 p.m. Central Time. Proposals must be submitted to Metro in a sealed opaque envelope. Each Proposal must make reference to the Project by name and number in the upper left-hand corner and shall identify the contents of the envelope as a "Sealed Proposal for Project NE-79-X001" and identify the name and address of the Proposer.

Proposals received after the time specified shall not be considered for award. Proposals received via facsimile (fax) or electronic mail (e-mail) shall not be considered. Proposals not meeting specified delivery and method of submittal will not be opened nor considered responsive.

Proposals must be addressed and delivered to Metro at the following address. This is also the address to be used for all communication in connection with this RFP:

Transit Authority of the City of Omaha d/b/a Metro
ATTN: Jeff Rumery, Grant Administrator
2222 Cuming Street
Omaha, Nebraska, 68102-4392

For information regarding this proposal, contact Jeff Rumery at (402)341-7560 EXT. 2601 phone, (402) 342-0949 fax or procurement@ometro.com. Any questions or requests for clarification are due from Proposers before Thursday, August 16th, 4:00 p.m. Central Time and must be submitted in writing to procurement@ometro.com. If required, Metro's response to these submissions will be in the form of an Addendum.

No person or entity submitting a proposal in response to this RFP, nor any officer, employee, agent, representative, relative or consultant representing such a person (or entity) may contact through any means, or engage in any discussion concerning the award of this contract with any member of Metro's Board or any employee of Metro (excluding Procurement staff) during the period beginning on the date of proposal issue and ending on the date of the selection of Contractor. Any such contact would be grounds for disqualification of the Proposer.

By: Mr. Jeff Rumery, Grant Administrator
Dates of Publication: July 27th, 2018
August 6th, 2018

REQUEST FOR PROPOSALS (RFP) INFORMATION AND GUIDELINES

OMAHA RAPID BUS TRANSIT (ORBT) STATION CANOPY PACKAGE
VARIOUS LOCATIONS ALONG NICHOLAS STREET, DODGE STREET, AND DOUGLAS STREET, OMAHA, NE
PROJECT #: NE-79-X001

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SECTION 1 – PROJECTED PROPOSAL CALENDAR

Proposal Advertised and Issued	July 27 , 2018
Non Mandatory Pre-Proposal Conference Metro' Administration Office Building- Board Room 2222 Cuming Street, Omaha, NE 68102	August 8, 2018 at 2:00 p.m.
Deadline for Questions, Comments, & Requests for Clarification	August 16, 2018 by 4:00 p.m.
Metro's Response to Questions/Requests for Clarifications	August 20, 2018 by 4:00 p.m.
Proposal Closing	August 28, 2018 at 2:00 p.m.
Interviews (Tentative, and if Required)	September 11th and 12th, 2018
Notice of Contract Award (Anticipated)	October 1, 2018

SECTION 2- SCOPE OF SERVICES

2.1 SCOPE

ORBT, Metro's bus rapid network (BRT) along Dodge Street connects several important nodes of activity in our region from downtown employment and entertainment to educational institutions and hospitals. Truly, this corridor is a key artery of our city. Providing more-frequent, consistent bus service on Dodge Street will enhance the cumulative use of the public transit system in our community. With the addition of 60' articulated vehicles and enhanced stations, customers reach their destinations with greater ease because of a faster, more reliable service. One of the more popular customer-friendly features includes real-time arrival information that helps transit customers know when the next vehicle will arrive. By adding technologies and an array of modern passenger amenities, ORBT will substantially enhance the transit experience for existing riders while attracting new transit customers. Among the features riders will encounter and experience along the ORBT line are:

- Frequent service
- Traffic signal priority
- Fewer stops for faster service
- Highly visible stations
- Level boarding platforms at each station
- Ticket-vending machines at each station
- Free Wi-Fi on buses and at stations
- Real Time Arrival Signs
- Station Monuments

Technical Specifications and Drawings for the project are attached to this RFP. The intent of the Plans and Specifications is to describe The Work which the Contractor undertakes to do, in full compliance with the Contract, and it is understood that the Contractor will furnish, unless otherwise provided in the Contract, all materials, machinery, equipment, tools, supplies, transportation, labor, and all other incidentals necessary to the satisfactory completion of the Work. The Plans and Specifications are complementary, and what is called for by either is as binding as if called for by both.

This work consists of all labor, materials, tools and equipment required for set-up of general plant, storage/staging areas and facilities, as well as the procurement of all bonds, permits, and insurance necessary for this project and as required by Federal and State Laws and City Ordinances; and the general mobilization of equipment required for the completion of the work as stated in the RFP Documents. The cost proposal shall include all permits and fees, as required, to perform the project, unless otherwise noted in the RFP Documents.

2.2 PROJECT REQUIREMENTS SUMMARY

A. A Disadvantaged Business Enterprise (DBE) Participation Goal has not been established for this project.

B. Minimum Prime Contractor Participation for this project is 30% of the contract amount.

C. A RFP Bond for 5% of the Contract Amount is required for this project.

D. Performance Bonds for 100% of the Contract Amount are required for this project. Payment Bonds may

be reduced based on contract value. Additional project value as added via approved change orders shall be addressed by amendment of bonds as requested by Metro.

E. Contract Completion.

Substantial completion for the Scope of Work shall be 12 months after the written Notice to Proceed. The Date of Substantial Completion of the Work is the date certified by written Notice that the work is 95% or more complete, with the exception of a minimal list of deficiencies, as provided by Metro's Project Manager.

F. Wage Rates.

Federal:
The U.S. Department of Labor has established minimum wages to be paid on this project. A copy of U.S. Department of Labor (Federal) General decision is attached. In the event that there is a question regarding rate of pay applicable to laborers, the higher rate shall prevail.

G. Completion

1. The Date of Substantial Completion of the Work is the date certified by written Notice that the work is 95% or more complete, with the exception of a minimal list of deficiencies.

2. Occupancy or utilization of Completed Work, or a portion of completed work, by Metro, does not constitute Substantial Completion or Final Acceptance.

3. Contractor has no right to damages for any causes of delay by Metro. Scheduling of the Work must be mutually agreed upon by Metro and the Contractor before Work can commence. Metro's operational requirements are paramount and shall take precedence. A request for an adjustment of time shall be forwarded in writing to Metro's Project Manager as soon as the Contractor is aware of circumstances beyond the Contractor's control. Requests shall include a statement of cause and expected time delay. The Project Manager may from time to time award extensions to the contract time justified by delay caused by either the Contractor or Metro, provided that adequate evidence is presented to enable the Project Manager to determine with exactness the extent and duration of delay for each item involved. Time may only be adjusted by Change Order.

4. The Contractor in his/her submittal of RFP Form(s) is undertaking to complete the Work within the stated and agreed contract time, has taken into consideration and made allowances for all of the ordinary delays and hindrances incident to such Work, whether because of delays in procuring equipment, materials, workers or other causes.

2.3 PROPOSAL INFORMATION

A. Contacts.

<u>Owner(s)</u>
Transit Authority of the City of Omaha d/b/a Metro
2222 Cuming Street
Omaha, NE 68102

Project Manager-
Joy Hottovy Willoughby
402-341-7560 ext. 2600
jwilloughby@ometro.com

Procurement-
Jeff Rumery
402-341-7560 ext. 2601
jrumery@ometro.com

Engineer
AECOM
564 White Pond Drive
Akron, Ohio 44320
330-836-9111

B. RFP Documents, Technical Specifications and Drawings are available for review at:

1. Metro Administrative Office
   2222 Cuming Street
   Omaha, Ne 68102
2. Metro's Website
   www.Ometro.com
3. StandardShare
   www.Standardshare.com

C. Pre-Proposal Conference will be held at Metro offices as listed in the Proposal Schedule. The purpose of this conference will be to present the proposed Work and field questions from attendees. Attendance is encouraged but not mandatory.

SECTION 3. PROPOSAL INSTRUCTIONS

3.1 Definitions

In addition to any other term that may be defined in the RFP Documents, whenever used in the RFP Documents, the following terms shall have the following meanings:

(a) **"RFP"** means and refers to the response and offer of a Proposer submitted on the prescribed forms and in the prescribed manner setting forth, among other matters, the prices for the Work to be performed. The RFP includes the completed proposal together with all other attachments, documents, instruments, forms, submissions, exhibits and schedules attached thereto or referenced therein or that is otherwise submitted or furnished (or is required to be submitted or furnished) to Metro at any time by a Proposer in furtherance of its RFP in accordance with the RFP Documents or that a Proposer is required by the RFP Documents to submit or furnish to Metro, including the Bid Security;
(b) **"Proposer"** means and refers to a responsible Proposer that has submitted a responsive RFP to Metro;
(c) **"RFP Documents"** means and refers to all documents issued by Metro in furtherance of the solicitation of RFPs for the Project. The RFP Documents include: (i) the Notice of Solicitation (including any other advertisement or invitation to RFP and any related published information), (ii) the RFP Documents together with all attachments, documents, instruments, forms, submissions, exhibits and schedules attached thereto or referenced therein, including the Supplemental Conditions, Construction Drawings and the Technical Specifications. (iii) all Addenda, (iv) all inquiries, notices, requests, forms, requests, documentation and other matters that a prospective Proposer is required or permitted to submit in furtherance of any communication with Metro pursuant to paragraph 2(m) of the Instructions to Proposer, (v) the Proposer's List Data Form,
(d) **"business day"** means Monday through Friday of a calendar week other than a day that is recognized by Metro as a holiday for Metro's administrative personnel;
(e) **"Contract"** means and refers to the entire integrated written agreement between Metro and Contractor concerning the Work and the Project. The Contract includes (i) all exhibits and schedules attached to the Contract, and (ii) all agreed to Change Orders (as defined in the Contract), each of which is or will be integrated into and made a part of the Contract. The Contract constitutes the entire agreement and supersedes all prior agreements and understandings, both written and oral, between Metro and Contractor as to the subject matter of the Contract;
(f) **"Contract Documents"** means and refers to (i) the RFP Documents, (ii) the RFP, (iii) the required performance bond and labor and material payment bond [and other required bonds], (iii) the Contract and any documents, information or other items or matters designated as such in the Contract,
(g) **"Contractor"** means and refers to the Proposer that has been awarded the Contract by Metro, but only if the Contract has been entered into by both Metro and Contractor and all conditions applicable to the award of the Contract and as otherwise may be set forth in the Contract Documents have been fully satisfied;
(h) **"include", "included", "including"** and words of similar import shall be construed as if followed by the phrase "without limitation";
(i) **"Governmental Authority"** means and refers to any governing bodies (including any governmental (and quasi-governmental), federal, state and local subdivision or unit of such governing body, together with their respective officials, authorities, agencies, departments and divisions) that has jurisdiction, whether in whole or in part, over any matter that, at any time, may relate to or pertain to any matter to which any Governmental Requirement may govern or apply. Governmental Authority includes the United States Department of Transportation ("**DOT**") and the Federal Transit Administration ("**FTA**");
(j) "**Governmental Requirement**" means any requirement of any Governmental Authority that is, or that may become, effective or applicable at any time to the any of the RFP Documents, the Contract Documents, the Project, the Work or Contractor's performance under and in respect of the Contract, including all Laws and

Regulatory Approvals of any Governmental Authority and all regulations, rules, orders, directives and standards and other requirements all regulations, rules, orders, directives and standards and other requirements issued or promulgated thereunder that Metro may be at any time be required to implement, observe, execute, follow or adhere to, whether by application of the provisions of the applicable Master Agreement between Metro and the FTA ("Master Agreement"), any Laws or Regulatory Approvals or otherwise;

(k) "**Law(s)**" means all statutes, laws, codes, ordinances, regulations, rules, orders, directives and standards of any Governmental Authority, that may be in effect or that may be or that may become applicable at any time to the any of the any of the RFP Documents, the Contract Documents, the Project, the Work, the Contract or Contractor's performance under and in respect of the Contract. Laws includes all Environmental Regulations and the Federal Transportation Act and all regulations, rules, orders, directives and standards and other requirements issued or promulgated thereunder;

(l) **"Project"** means Omaha Rapid Transit Station Canopy Package PROJECT NO.: NE-79-X001; "Project" is sometimes used interchangeably with "Work" and, if so, shall be ascribed that definition;

(m) "**Regulatory Approval**" means any and all approvals, licenses, permits, consents, registrations or authorizations, certificates, forms and licenses of any Governmental Authority that may be in effect or that may be or that may become applicable at any time to the RFP Documents, the Contract Documents, the Work, the Project or Contractor's performance under or in respect of the Contract;

(n) "**Representative**" means and refers to AECOM, 564 White Pond Drive, Akron, Ohio 44320; and

(o) "**Work**" means and refers to all supervision, direction, employees and other labor, all materials, supplies, services, work, machinery, transportation, tools, equipment, plant required for set-up of general plant, storage/staging areas and facilities, and all other tasks and incidentals necessary to fabricate, construct, assemble, install and otherwise perform and complete the Project, the Work and the Contract as and when required and otherwise in conformity with the Contract Documents.

3.2 Reservations

A. Metro reserves the right to waive informalities or irregularities in proposals, to accept or reject any or all proposals, to cancel this RFP in part or in its entirety, and to re-advertise for proposals if it is in the best interest of the Authority.

B. Metro also reserves the right to award a contract solely on the basis of the initial proposal without any interviews or negotiations. Therefore, proposals should be submitted to KCATA on the most favorable terms possible, from a cost or price and technical standpoint.

C. This solicitation for RFPs shall not be considered to be an offer to award the Contract. This solicitation may be amended, modified, withdrawn or canceled by Metro at any time for any reason or for no reason. Whether not Metro amends, modifies, withdraws or cancels this solicitation, Metro is not responsible for any cost or expense that may be incurred by any prospective proposer or any proposer incurred prior to the execution of the Contract, including any costs associated with preparing a Proposal. No Proposal shall be considered binding upon Metro unless (i) a Contract first has been awarded by its Board of Directors at a public meeting, (ii) the Contract has been duly executed by each of the Contractor and Metro, and (iii) all conditions applicable to such award of the Contract and as otherwise may be set forth in the Contract Documents have been fully satisfied. Metro reserves the right to withdraw or cancel the award of the Contract for any reason or no reason without liability. In the event of the withdrawal or cancellation of this solicitation or the award of the Contract, the Bid Security of each Proposer shall be released and returned by Metro.

3.3 Proposer's Responsibilities

A. Without prejudice or limitation to any other representation required to be made or otherwise made by Proposer with its Proposal, the submission of its Proposal constitutes a representation by Proposer that,
   1) Proposer has read and understands the RFP Documents and the Proposal is made in accordance with all requirements of the RFP Documents;
   2) Proposer possesses the capabilities, resources, and personnel necessary to perform the Work in accordance with the Contract Documents;
   3) Proposer is duly organized and existing under and by virtue of the Laws of the state of its organization and has the power to transact business in the State of Nebraska;
   4) Proposer has all power, authority and capacity under all applicable Laws and under its organizational and constituent documents to enter into and to perform under and in respect of the Contract;
   5) The Proposal has been duly authorized, executed and delivered by Proposer;
   6) Proposer has read and thoroughly examined the RFP Documents and has a complete understanding of the terms and conditions required for the full and complete performance of the Work in conformity with the Contract Documents;
   7) Before submitting its Proposal, Proposer has made all investigations and examinations necessary to ascertain the character, location and other conditions and requirements pertaining to the Work site and the Work that it has determined may affect in any way its full and complete performance of the Work in conformity with the Contract Documents;
   8) Proposer has found no errors, conflicts, ambiguities or omissions in any of the RFP Documents;
   9) Proposer is familiar with all applicable Governmental Requirements applicable to the Project, the Work, the Contract and Proposer's required performance (as Contractor) under and in respect of the Contract;
   10) To the best of Proposer's knowledge, after due and diligent investigation and inquiry,
      a. No member of Metro's Board of Directors nor any of Metro's officers or employees is employed by, or has a financial interest, direct or indirect, in the Bid, the contemplated Contract, the Proposer or any Subcontractors,
      b. No gratuities have been offered or given by or on behalf of Proposer with an intent to secure the Contract, and
      c. Neither the award of the Contract to the Proposer nor its performance (as Contractor) under or in respect of the Contract will result in any conflict of interest that is prohibited under any Governmental Requirement, including any such conflict referenced or described in the Master Agreement or in Section 7 or Section 8(a)(5) of FTA Circular 4220.1E.

3.4 Identification of Proposer

With its Proposal, Proposer must separately be identified fully and completely in an attachment to its Bid referencing this Paragraph 3.4, whether a natural person/individual, partnership (general or limited), corporation, limited liability company, association or other form of business organization (whether or not regarded as a legal entity under Applicable Law), trust, estate or any other entity. If an individual doing business under a fictitious name submits a Proposal, the Proposal should so state. If a Proposal is made by a partnership or a limited liability company, the full names and addresses of all members of the partnership or limited liability company must be given. In the case of a partnership, a general partner must sign the Proposal. In the case of a limited liability company, the manager or authorized member must sign the Proposal. If a corporation makes the Proposal, an authorized officer must sign the Proposal. If the Proposal is made by a

joint venture, the full names and addresses of all members of the joint venture must be given and one authorized member should sign the Proposal. If applicable, a copy of the partnership/joint-venture agreement/operating agreement shall be included as an attachment to the Proposal. Each Proposal shall be made in the name of the Proposer, dated and signed with an ink pen by the appropriate individual, whose name and title also shall be printed or legibly written. Signatures shall be accompanied by the address (including city, State and zip code) and the telephone number of the Proposer. If the Proposal has been submitted by an agent of Proposer, evidence of the power of attorney must be attached to the Proposal. Metro reserves the right to verify the status of the signatory.

3.5 Firm Bids and Bid Security

All Proposal shall remain firm (and may not be withdrawn without forfeiture of the Bid Security) for no less than ninety (90) days after the date of the Proposal Submittal Date. Each Proposal must be accompanied by a bid bond made payable to The Transit Authority of the City of Omaha in the amount of five percent (5%) of the full expected Contract Amount (reflected in U.S. Dollars) for all Work ("**Bid Security**"). The Bid Security shall be written by a licensed surety firm authorized to do business in the State of Nebraska. A current power of attorney for the person signing the bond as a representative of the surety must be attached to the Bid Security. The Bid Security must be issued by a surety authorized to do business in the State of Nebraska that is listed in the current issue of the most recent revision of the United States Treasury Circular 570. Failure to submit the Bid Security will result in the Proposal being considered non-responsive. It is anticipated that Metro will award a Contract for the Project no later than ninety (90) days after the Proposal Submittal Date. Metro reserves the right to extend the date to award the Contract by issuing an Addendum for such purposes, notice of which shall be sent to all Proposers whose Proposal then has not been rejected by Metro. However, if so extended by Metro, any Proposer may elect to withdraw its Proposal by written notice to Metro ("**Propose Notice of Withdrawal of Proposal**"), but only if such notice has been received by Metro not later than 4:30 p.m. on the date that is three (3) days after the date of the issuance of the Addendum extending the anticipated date to award the Contract, in which event the Bid Security promptly shall be returned to the Proposer and the Proposer's Proposal will no longer be eligible for consideration. If Metro issues any such Addendum, then notwithstanding anything contained in the RFP Documents to the contrary, except when a Proposer has withdrawn its Proposal in accordance this paragraph 3.5, or Metro has released the Bid Security of a Proposer in writing, the Bid Security of a Proposer shall remain firm (and may not be withdrawn without forfeiture of the Bid Security) until the Contract is executed and all conditions to the award of the Contract have been fully satisfied.

3.6 Contractor Responsible for All Work/Performance; Minimum Contractor Participation

Contractor shall be responsible for all performance undertaken or required under or in respect of the Contract, including the performance of all Work and providing all services, equipment, facilities, and functions which are necessary for the safe, reliable, efficient, and well-managed operation of the Project, the Work and the Contract consistent with established industry practices, whether or not those services, equipment, facilities, and functions are specifically required by the terms of the Contract or in any RFP Document. Notwithstanding Contractor's use of any Subcontractors, Contractor shall have a minimum participation level of not less than thirty percent (30%) of the Contract Amount.

3.7 Communication with Metro

A. General Inquiry. Other than as otherwise expressly required in this paragraph 3.7(A) any inquiry (other than those made at the Pre-Proposal Conference) relating to the RFP Documents, the Project or the Work must be

made in writing to the Grant Administrator and must be received by Metro no later than 4:00 p.m on August 16th, 2018. Each inquiry must refer to the Project by name and submitted on the Request for Clarification Form Provided in the RFP Documents. Metro will issue a response to any such request by written Addendum.

B. Errors and Discrepancies in RFP Documents. If a Proposer believes that there may exist an error, discrepancy, ambiguity or omission in any RFP Document, then prior to the submission of its Proposal, Proposer must notify the Grant Administrator of the same by written notice on the Request for Clarification Form. By submission of its Proposal, Proposer represents there exists no error, discrepancy, ambiguity or omission in any of the RFP Documents that would change the cost, progress or performance of the Work. Metro will review, evaluate and respond in the same manner as any other inquiry made pursuant to the RFP Documents. Whether or not approved, Metro will issue a response to Proposer's inquiries by written Addendum.

C. Requests for Approved Equals, Product Options and Substitutions**.** Wherever brand, manufacturer, or product names are used in respect of the Work, they are included only for the purpose of establishing a description of minimum quality of the requested item unless otherwise specified in the specifications or other RFP Documents. This inclusion is not to be considered as advocating or prescribing the use of any particular brand or item or product. Prospective Proposers may discuss the specifications and related matters with the Grant Administrator; however, any requests for approved equals or other substitutions must be made to the Grant Administrator in writing by use of the "**Request for Substitutions/Approved Equals**" form included in the RFP Documents, which must be received by Metro no later than 4:00 p.m. on August 16, 2018. When an approved equal is requested, if so requested by Metro, the prospective proposer must demonstrate the quality of its alternative product to Metro and furnish sufficient technical data, test results, etc., to enable Metro to determine whether the product is or is not equal to specification required by the RFP Documents. Whether or not approved, Metro will issue a response to a Request for Substitutions/Approved Equals by written Addendum. The Contract will provide that Metro may reject any request by Contractor following the award of a Contract for a substitute or qualified equal, in its Metro's sole judgment and absolute discretion.

D. Modifications to Proposals; Withdrawal of Proposals. Any Proposer that has submitted a Proposal may modify or withdraw its Proposal at any time prior to the Submission Deadline. Withdrawal of a Proposal may be made only with written confirmation under signature of the Proposer. Withdrawal of a Proposal will not prejudice the right of any Proposer to submit a new Proposal in its own name or in combination with another Proposer, provided that the new Proposal is received by Metro as of the Submission Deadline. Modifications to a Proposal and requests to withdraw a Proposal received by Metro after the Submission Deadline will have no effect and will be returned unopened.

E. Submission by Prospective Proposers**.** For avoidance of any doubt, all inquiries, notices, requests, forms, requests, documentation and other matters that a prospective proposer is required or permitted to submit in furtherance of any communication with Metro pursuant to this paragraph 3.7(E) must be made in the name of the prospective proposer or Proposer, as may be applicable.

F. Addendum; Metro Initiated Addendum; Proposer Responsibility. No verbal or written instructions or interpretations in respect of the RFP Documents, the Contract Documents or the Project will have effect or validity regardless of source unless made in the name of the Grant Administrator in the form of a written Addendum. Complete copies of each related form, inquiry, request or submission etc. made pursuant to this paragraph 3.7(F), together with the corresponding Addendum (and any other Addendum contemplated by the RFP Documents) will be available for inspection at Metro's Administrative Offices and online at the following links http://www.standardshare.com and www.ometro.com . Nothing in the RFP Documents shall be construed to restrict Metro from issuing any Addendum at any time or at its own initiation.

Notwithstanding anything contained in the RFP Documents to the contrary, it is the responsibility of the Proposer to obtain copies of all issued Addenda. Proposer is required to acknowledge on the form and manner required by the RFP Documents that it has received all issued Addenda, and failure to do so will cause the Bid to be deemed non-responsive.

3.8 Protests

A. Pre-Submittal Protests. A pre-submittal protest is protest received prior to the Submission Deadline. This protest must be made in writing and received by the Grant Administrator not later than 2:00 pm. on the date that is not later than three (3) business days prior to the Submission Deadline. This protest must be addressed as follows: Protest, Project ###, Grant Administrator, 2222 Cuming St, Omaha NE 68102.

B. Post-Submission Deadline/Pre-Award Protests. A Post-Submission Deadline/pre-award protest is a protest against making an award of the Contract, must be made in writing and received by the Grant Administrator not later than 2:00 p.m. on the date that is not later than five (5) days after the submission date. This protest must be addressed as follows: Protest, Project ###, Grant Administrator, 2222 Cuming St, Omaha NE 68102.

C. Post-Award Protests. A Post-Award protest is a protest against making an award of the Contract to the successful Proposer as determined by Metro. This protest must be made in writing and received by the Grant Administrator not later than 2:00 p.m. on the date that is five (5) business days after the date of the Notice of Intent to Award the Contract. This protest must be addressed as follows: Protest, Project ###, Grant Administrator, 2222 Cuming St, Omaha NE 68102.

D. Protest Limitations and Requirements. Protests are limited to those allowable by, and made in compliance with, the protest procedures currently established by Metro ("Protest Procedures"), a copy of which are available for inspection at the Administrative Offices. All protests must be concise, direct and sufficient to permit Metro to determine the full and complete basis therefor and shall be fully supported by all current, accurate, relevant, objective information, documentation and other support considered necessary by the prospective proposer or Proposer, as may be applicable. Metro reserves the right to request additional support from the protester. In the event of an appeal from the award of a Contract, the award shall not be considered final or binding upon Metro unless the Contract award is thereafter confirmed to the successful Proposer in writing by the Executive Director.

E. Metro Response. The Grant Administrator will respond to the protest no later than five (5) days after the protest has been received by the Grant Administrator. Appeals from the Grant Administrator's determination must be made to the Executive Director as, when and in the manner required by the Protest Procedures. The Executive Director will decide if the protest and the appeal (if any) have been given fair and reasonable consideration, or if additional consideration is warranted. The Executive Director's decision will be provided within ten (10) days after receipt of protester's appeal from request. The Executive Director's decision is final, and no further action on the protest will be taken by Metro.

F. Extensions of Time and other Effects of Protest. Without limitation to any other provision in the RFP Documents, if deemed appropriate to resolve any protest Metro may extend the Submission Deadline and the award of the Contract, issue an Addendum or withdraw this solicitation, or postpone, reconsider any award of a Contract or cancel this solicitation, all as determined in the sole judgment and absolute discretion of Metro.

G. Appeals to FTA. For information purposes only, protesters should be aware of the Federal Transit Administration's protest procedures with the FTA Regional Office (ref: FTA Circular 4220.1F). If Federal funding is involved, the FTA will review protests from a third party only when a grantee does not have a written protest procedure or fails to follow its procedure or fails to review a complaint or protest; or violations of specific federal Governmental Requirements have occurred. A protester must exhaust all administrative remedies with Metro before pursuing a protest with the FTA. An appeal to the FTA by the protester must be received by the appropriate FTA regional or Headquarters Office within five (5) working days of the date the Proposer knew or should have known of Metro's final decision in respect of the protest. Such protests shall be addressed to: Regional Administrator, FTA Region 7, 901 Locust, Room 404, and Kansas City, MO, 64106.

3.9 Disclosure of Proprietary Information.

A. By submission of its Proposal, a Proposer acknowledges that Metro is a public body to which Laws of the State of Nebraska governing the disclosure of public records (Neb. Rev. Stat. 84-712 to 84-712.09, inclusive; "Public Records Statutes") have application. A Proposer may attempt to restrict the disclosure of scientific and technological innovations in which it has a proprietary interest, or other information that is protected from public disclosure by Law contained in the Proposal by:

1) marking each page of each such document prominently in at least 16-point font with the words "Proprietary Information",
2) printing each page of each such document in a different color paper than the paper which the remainder of the proposal is printed; and
3) segregating each page of each such document in a sealed envelope, which shall prominently display, on the outside, the words "Proprietary Information" in at least 16-point font, along with the name and address of the Proposer.

If access to documents marked "Proprietary Information" (and otherwise complying with (1) through (3) above), is requested pursuant to the Public Records Statutes, Metro will notify the Proposer of the request. The Proposer shall have the burden to establish that such documents are exempt from disclosure under the Public Records Statutes, and Metro shall not be responsible to undertake any act or action to prevent any such disclosure. Notwithstanding the foregoing, Metro reserves the right to release any documents requested pursuant to the Public Records Statutes if Metro determines that such information is a public record under the Public Records Statutes.

3.10 Disadvantaged Business Enterprise (DBE) Requirements

A. The requirements of 49 Code of Federal Regulations ("**CFR**") Part 26 shall apply to the Contract. It is the policy of Metro to practice nondiscrimination based on race, color, sex, or national origin in the award or performance of this Contract. Metro encourages participation under this solicitation by all responsible and qualifying firms regardless of business size or ownership. Metro has established a specific Disadvantaged Business Enterprise ("**DBE**") participation goal for the Contract in the amount of **0%** of the Contract Amount ("**DBE Participation Goal**") through race/gender neutral means. Metro's overall DBE participation goal for all contracts for FFY 2017 – 2019 is 9.87%. In order to receive the award of the Contract, Title 49 Code of Federal Regulations (CFR) Part 26, requires the apparent low Proposer must establish either (i) that it has met the DBE Participation Goal through race/gender neutral means; or (ii) that it has made adequate good faith efforts to meet the DBE Participation Goal. This requirement is in addition to all other pre-award requirements.

1. Attaining DBE Contract Goals

a. Prime contractors shall, at a minimum, seek certified DBE Subcontractors in the same geographic area in which they generally seek subcontractors for a given solicitation. If the Proposer cannot meet the DBE goals using certified DBEs from the same geographic area, the Proposer may expand its search to a reasonably greater geographic area.

b. Prime contractors are required to make good faith efforts to replace a DBE Subcontractor that is unable to perform with another certified DBE Subcontractor. In order to ensure compliance with this requirement, any substitution of DBE Subcontractors after execution of the Contract must be approved by Metro as outlined in 49 CFR Part 26.

c. Metro encourages prime contractors on DOT assisted contracts to investigate to the full extent of services offered by financial institutions owned and controlled by socially and economically disadvantaged individuals in the community and to make reasonable efforts to use these institutions.

2. Soliciting DBEs

All Proposers should make every reasonable effort to subcontract work to DBEs through Good Faith Negotiations and solicitations in advance of the dates specified in this solicitation for submitting and opening of proposals.

Only those DBEs who are currently certified through the Nebraska Department of Transportation (NDOT) Civil Rights Office or DBEs having certification that can be made final through the NDOT Civil Rights Office in accordance with applicable provisions of 49 CFR Part 26 before the due date for this solicitation on which a firm seeks to participate as a DBE will be considered in meeting the DBE contract goal for this project. For a listing of Nebraska certified DBEs see: http://dot.nebraska.gov/business-center/civil-rights.

3. Evaluation of Bid Proposals for DBE Participation

a. Meeting DBE Project Goal Criteria: The Proposer must either meet or exceed the established DBE goal(s) for the project or submit documentary evidence with their bid substantiating that good faith efforts were made to meet the established DBE goal(s).

b. Required DBE Information as a matter of Proposer responsiveness:
The award of this Contract by Metro is conditioned upon the Proposer satisfying the good faith effort requirements of 49 CFR 26.53. Proposers must present all of the required DBE information with their proposal as a matter of responsiveness for consideration of the proposal, as follows:
   i. All bidding firms are required to include a completed *DBE Participation Form* (included in this solicitation) and *DBE Confirmation Form* (included in this solicitation); and
   ii. All bidding firms are required to include a completed ***Bidder's List Form***.
   iii. If the DBE goal(s) is/are not met, documentary evidence of good faith efforts.

4. Evaluation of Responsiveness:

a. A Bid proposal will not be read if the required DBE information is not included.

b. If no DBE participation is intended by Proposer, the DBE Participation Form must indicate that good faith effort documentation is included with the bid proposal. A signed, blank or incomplete DBE Participation Form will be interpreted as meaning that no DBE participation is intended, and the bid deemed as not complying with submission of required DBE information and determined non-responsive.

c. Required DBE information shall not be subject to revision after the closing date of specified in the solicitation.

d. The information submitted on the DBE Participation Form will be verified by Metro's designated DBE Liaison Officer (DBLEO). Errors in addition will be treated in accordance with Metro's current specifications and procedures.

5. Good Faith Efforts to Secure DBE Participation

a. If the Proposer fails to meet or exceed the established DBE goal, the Proposer must submit documentation evidencing that bona fide good faith efforts were undertaken to secure DBE participation as provided by 49 CFR Part 26, Appendix A, Part IV, quoted in italics below:

IV. The following is a list of types of actions which you should consider as part of the Proposer's good faith efforts to obtain DBE participation. It is not intended to be a mandatory checklist, nor is it intended to be exclusive or exhaustive. Other factors or types of efforts may be relevant in appropriate cases.

A. (1) Conducing market research to identify small business contractors and suppliers and soliciting through all reasonable and available means the interest of all certified DBEs that have the capability to perform the work of the contract. This may include attendance at pre-bid and business matchmaking meetings and events, advertising and/or written notices, posting of Notices of Sources Sought and/or Requests for Proposals, written notices or emails to all DBEs listed in the State's directory of transportation firms that specialize in the areas of work desired (as noted in the DBE directory) and which are located in the area or surrounding areas of the project.

(2) The Proposer should solicit this interest as early in the acquisition process as practicable to allow the DBEs to respond to the solicitation and submit a timely offer for the subcontract. The Proposer should determine with certainty if the DBEs are interested by taking appropriate steps to follow up initial solicitations.

B. Selecting portions of the Work to be performed by DBEs in order to increase the likelihood that the DBE goals will be achieved. This includes, where appropriate, breaking out Contract Work items into economically feasible units (for example, smaller tasks or quantities) to facilitate DBE participation, even when the prime contractor might otherwise prefer to perform these Work items with its own forces. This may include, where possible, establishing flexible timeframes for performance and delivery schedules in a manner that encourages and facilitates DBE participation.

C. Providing interested DBEs with adequate information about the plans, specifications, and requirements of the Contract in a timely manner to assist them in responding to a solicitation

with their offer for the subcontract.

D. (1) Negotiating in good faith with interested DBEs. It is the Proposer's responsibility to make a portion of the Work available to DBE Subcontractors and suppliers and to select those portions of the Work or material needs consistent with the available DBE Subcontractors and suppliers, so as to facilitate DBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of DBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional Agreements could not be reached for DBEs to perform the Work.

> *(2) A Proposer using good business judgment would consider a number of factors in negotiating with subcontractors, including DBE Subcontractors, and would take a firm's price and capabilities as well as contract goals into consideration. However, the fact that there may be some additional costs involved in finding and using DBEs is not in itself sufficient reason for a Proposer's failure to meet the contract DBE goal, as long as such costs are reasonable. Also, the ability or desire of a prime contractor to perform the Work of a contract with its own organization does not relieve the Proposer of the responsibility to make good faith efforts. Prime contractors are not, however, required to accept higher quotes from DBEs if the price difference is excessive or unreasonable.*

E. (1) Not rejecting DBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. The Contractor's standing within its industry, membership in specific groups, organizations, or associations and political or social affiliations (for example union vs. non-union status) are not legitimate causes for the rejection or non-solicitation of bids in the contractor's efforts to meet the project goal. Another practice considered an insufficient good faith effort is the rejection of the DBE because its quotation for the work was not the lowest received. However, nothing in this paragraph shall be construed to require the Proposer or prime contractor to accept unreasonable quotes in order to satisfy contract goals.

> *(2) A prime contractor's inability to find a replacement DBE at the original price is not alone sufficient to support a finding that good faith efforts have been made to replace the original DBE. The fact that the Contractor has the ability and/or desire to perform the Contract Work with its own forces does not relieve the contractor of the obligation to make good faith efforts to find a replacement DBE, and it is not a sound basis for rejecting a prospective replacement DBE's reasonable quote.*

F. Making efforts to assist interested DBEs in obtaining bonding, lines of credit, or insurance as required by the recipient or contractor.

G. Making efforts to assist interested DBEs in obtaining necessary equipment, supplies, materials, or related assistance or services.

H. Effectively using the services of available minority/women community organizations; minority/women contractors' groups; local, State, and Federal minority/women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of DBEs

6. Small Business Enterprise (SBE) Participation Program.

Metro has incorporated as an element of its DBE program, reasonable steps to eliminate obstacles for small business enterprises (SBEs), both DBE and non-DBE, in order to facilitate their competition on DOT assisted contracting opportunities, as provided by 49 CFR 26.39, as amended October 2, 2014.

a. **Purpose/Objectives.** The purpose of Metro's Small Business Enterprise Participation Program is to foster race-neutral small business participation in DOT assisted projects. Since small business elements developed by Metro will be a part of its approved DBE program plan. Metro will use the definition of "small business concerns" set out in 49 CFR §26.5, as amended, in administering its program. This will ensure that all small businesses allowed to participate in the program (DBEs and non-DBEs) are subject to the same size standards and, consequently compete with similarly-sized businesses. By facilitating participation for small businesses, Metro believes that establishing program elements that pull together various ways for reaching out to small businesses, makes it easier for the small businesses to compete for DOT-assisted contracts, thus fostering the objectives of Metro's DBE program.

b. **Definitions of Terms.** The definitions of terms contained in 49 CFR § 26.5, as amended October 2, 2014, shall be used as definitions in Metro's Small Business Enterprise Participation Program and are hereby incorporated by reference.

c. **Fostering Small Business Participation.** As part of accomplishing this program element, Metro will actively use the following strategies to foster small business participation:

   i. Metro will consider unbundling contracts on a case-by-case basis. The DBELO will review all scopes of work to determine if there are sections of work where there are definitely separable items that can be unbundled. Thus, when practical, on large scope contracts containing work involving different disciplines or trades, such contracts will be divided into potentially smaller contracting opportunities.
   ii. On prime contracts exceeding $100,000 not having DBE contract goals, Metro will require the prime contractor to provide subcontracting opportunities of a size that small business concerns, including DBEs, could reasonably perform, rather than self-performing all the work. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate SBE/DBE participation, even when the prime contractor might have the ability and otherwise prefer to perform these work items with its own forces.
   iii. Generate awareness of Metro's procurement opportunities to small businesses by utilizing broader advertising in print and electronic media, and advertisement circulation to small business representatives and stakeholder groups.
   iv. Participate in business development meetings and other stakeholder group hosted events intended to enhance procurement opportunities for small businesses.
   v. Identify DBEs, non-DBE and SBEs in the local market area using Metro's Proposers list.

d. **Eligibility Standards.** To ensure the eligibility of a small business concern, Metro will take steps to verify eligibility of a small business concern to participate in its Small Business Participation Program. Metro's Small Business Enterprise Participation Program prohibits small business concerns to self-certify/verify as small businesses.

Therefore, *only* those currently certified SBEs or SBEs that can be certified by the City of

Omaha prior to a contract award are eligible for participation in Metro's Small Business Enterprise Participation Program. See: http://www.cityofomaha.org/humanrights/contract-compliance **for a listing of City of Omaha eligible SBCs.**

Certified SBEs should be noted on the Required Bidder's List Data form (Division 2).

e. **Goal Setting/Reporting Requirements:** Metro's Small Business Enterprise Participation Program is intended to facilitate compliance with the 49 CFR §26.51, as amended October 2, 2014, (1) to meet the maximum feasible portion of Metro's overall DBE goals by using race-neutral means of obtaining DBE participation; and (2) to implement race-conscious measures by establishing goals that apply only to DOT-assisted contracts with subcontracting opportunities to meet any portion of the overall goal Metro is unable to meet using race-neutral means alone. The use of race-neutral small business goals on the same contracts that have DBE contract goals is difficult to administer. Therefore, Metro will not establish small business participation project goals in any contract solicitation that has a specified DBE goal.

Pursuant to 49 CFR §26.11(a), as amended October 2, 2014, Metro is required to track DBE project participation and transmit data via the Uniform Report of DBE Awards or Commitments and Payments to the applicable DOT operating administration. *See:* http://www.transportation.nebraska.gov/letting/DBE/Certifed_DBEs_4-25-16.pdf *for the Directory of Nebraska of Department of Roads (NDOR) Certified Disadvantaged Business Enterprises.*

Therefore, race-neutral participation of DBEs certified through the NDOT achieved through the Small Business Enterprise Participation Program shall be counted towards attainment of Metro's overall DBE project goal established for any DOT-assisted contracts.

7. Good Faith Efforts Reconsideration.

If Metro's preliminary finding is that the proposer did not demonstrate a satisfactory effort to meet the contract DBE goal(s), the proposer may appeal the preliminary finding by submitting a writing request for reconsideration with three (3) days of the preliminary finding. The proposer may then present information either in a written narrative supporting its good faith efforts, or may appear in person. Any and all new information not included in the original SOQ documents will be excluded from the final determination. The appeal will be herd by a hearing officer appointed by the Executive Director. The hearing officer will be an individual who is knowledgeable about the DBE Program and its good faith efforts provision, but how had no part in the preliminary finding. The hearing officer will hear the appeal within five (5) days of receipt of the written request, and issue a written decision within three (3) days following the appeal hearing. The hearing officer's decision is administratively final, and has no further appeal.

8. Substitution of DBE.

The Contract will require the Proposer awarded the Contract to promptly notify Metro whenever a DBE Subcontractor performing work related to the Work is terminated or fails to complete its Work, and must make good faith efforts to engage another DBE Subcontractor to perform at least the same amount of Work. The Proposer may not terminate any DBE Subcontractor and perform that Work through its own forces or those of an affiliate without prior written consent of Metro.

SECTION 4. PROPOSAL SUBMISSION, EVALUATION AND AWARD

4.1 Proposal Copies

A. The proposal package consists of two (2) sealed packages.

B. The first sealed package should contain an original and six (6) bound, full, complete, and exact copies of the Technical Proposal. The package should be clearly labeled "Omaha Rapid Bus Transit Station Canopy Package NE-79-X001".

C. The second sealed package should contain an original and one (1) full, complete, and exact copies of the Cost Proposal. The package should be clearly labeled– "Omaha Rapid Bus Transit Station Canopy Package NE-79-X001-Cost Proposal."

D. Proposers are asked to submit a complete set of their Proposal Documents in an electronic format (flash drive) and submit with Cost Proposal packet.

E. Pages in the Proposal document shall be numbered. The Proposer shall ensure that all copies and all electronic media are identical to the Proposer's hardcopy, original submission. In case of a discrepancy, the hard copy shall govern.

4.2 Technical Proposal Format

A. The technical proposal page limit is 20 pages. The Proposer may choose to allocate pages between any of the criteria as long as the proposal does not exceed 20 pages. If a Proposer submits a proposal exceeding this limit, Metro will consider the pages up to the allowable number and discard all subsequent pages.

B. The following are excluded from the page count:

- Title Page
- Table of Contents
- Letter of Transmittal
- Tabs or Indices
- Additional lists of references
- Résumé/background information (please restrict to a maximum of three (3) pages per individual)
- Required forms such as certifications, financial data
- Vendor Registration Form
- Required Submittal Forms found in Division 2

C. One page is defined as one side of a single, 8-1/2 x 11" page, with 11-point minimum font size for the substantive text. Any page over this size will be counted as two (2) pages. Any page or partial page with substantive text, tables, graphics, charts, résumés, etc. will be counted as one (1) page. Proposers may use their discretion for the font size of other materials (e.g. graphics, charts).

4.3 Technical Proposal Content

A. Each technical proposal should enable the evaluation committee to make a thorough evaluation and arrive at a sound determination as to whether or not the proposal will meet Metro's requirements. Each technical proposal must be so specific, detailed and complete as to clearly and fully demonstrate that the Proposer has a thorough knowledge and understanding of the requirements and has valid and practical solutions for technical problems. Statements which paraphrase the requirements or attest that "standard procedures will be employed" are inadequate to demonstrate how the Proposer will comply with the requirements of this procurement.

B. To achieve a uniform review process and obtain the maximum degree of compatibility, technical proposals must be organized as follows:

1. Title Page

   Show the RFP title, the name of the firm, address, telephone number(s), name and title of contact person, telephone number(s), email address, facsimile number and date.

2. Table of Contents

   Clearly identify the materials by section and page number.

3. Letter of Transmittal

   The letter should be addressed to Grant Administration, Jeff Rumery, and signed by a corporate officer with authority to bind the firm. The letter must contain the following:

   a. Identification of proposing firm(s), including name, address, telephone number(s) and email addresses of each subcontractor

   b. Proposed working relationship among proposing firms (e.g., prime, subcontractor), if applicable

   c. Acknowledgement of receipt of RFP addenda, if any

   d. Name, title, address, telephone number and email address of the contact person for this project

   e. Briefly state the firm's understanding of the services to be performed and make a positive commitment to provide the services as specified

4. Experience and Qualifications

   a. Provide a brief synopsis of the firm, including when and where incorporated, major business activities, and a listing of officers of the company. State whether the firm is local, regional, or national and how long the firm has been in existence under current ownership/management.

   b. This section should demonstrate the Proposer's experience, skills and qualifications of the Project Manager and other key personnel in the manufacturing and installation of bus passenger shelters and amenities in meeting goals, objectives and schedules. Describe direct experience administering and operating similar projects during the last three (3) years. Identify and describe in detail any plans on services the Proposer will provide that are not specifically

required in this RFP.

c. Provide resumes for the proposed Project Manager and other key personnel and discuss the unique qualifications these individuals bring to the project.

d. To demonstrate the Project Manager's experience, provide references on up to five (5) representative projects. At least one reference contact (including name, title, e-mail address and telephone number) should be provided for each project. Include role of the Project Manager, contract amount, and contract start and end dates.

5. Financial Condition of the Firm. Financial data will be held in confidence and will not become part of the awarded contract file. In this section the Proposer must submit information demonstrating that the Firm is financially sound and has the necessary financial resources to perform the contract in a satisfactory manner. The Proposer is required to permit Metro to inspect and examine its financial statements. The Proposer shall submit the firm's most recent unaudited financial statements as well as two (2) years of its most recent audited annual financial statements. These statements should be included with the Cost Proposal submittal and consist of Statement of Financial Position (Balance Sheet), Results of Operations (Income Statement), Statement of Cash Flow, and Statement of Retained Earnings, and applicable footnotes. Supplementary financial information may be requested as necessary.

6. Production Capability

a. This section should describe and specifically demonstrate the experience, skills and qualifications of key personnel and team to perform the required services. Present the work and project management approach and techniques required for quality control of the Work including submittal of shop drawings, manufacturing methods, quality oversight and onsite installation, including shipping "just-in-time" to each location. At minimum address and include preliminary production schedule to include submittal of shop drawings, accuracy, level and output of manufacturing, and installation of specified products. Identify employee numbers/resources used for completion of the Work.

b. Provide an organizational chart showing how the project will be staffed in all functional areas. Indicate the number of employees of each type and percentage of time employees will be committed to this proposed project.

c. Provide details of the production facility to be used. This should include location of site, square footage of production area, fabrication equipment to be used, paint booth area, storage, installation equipment and other details to show sufficient capacity and ability to complete the Work required.

d. Provide a list of manufacturing contracts in progress or anticipated contracts which may run concurrent with this proposed Work. Include in the proposed timeline or schedule submitted the other work anticipated.

7. Subcontractor Utilization Plan. Subcontractors must be approved by Metro prior to contract award. For each anticipated subcontract, provide:

a. Subcontractor's name, address, and telephone number including the name, title and telephone number of the contact person

b. DBE category, if applicable

c. Type(s) of goods or services to be provided

d. Estimated value of subcontract

e. The following signed and dated certification statement: "I certify that each subcontractor has been notified that it has been listed in this proposal and that each subcontractor has consented, in writing, to its name being submitted for this RFP. Additionally, I certify that I shall notify each subcontractor in writing if the award is granted to my firm, and I will make all documentation available to Metro upon request."

8. Exceptions, Omissions and Form of Contract

a. Exceptions. The proposal should clearly identify any exceptions to the requirements set forth in this RFP.

b. Omissions. The Contractor will be responsible for providing all services, equipment, facilities, and functions which are necessary for the safe, reliable, efficient, and well-managed operation of the program, within the general parameters described in this RFP, and consistent with established industry practices, regardless of whether those services, equipment, facilities, and functions are specifically mentioned in this RFP or not. The Proposer should clearly identify any omissions to the requirements set forth in the RFP.

c. Sample Contract and Conditions. In addition to carefully reading all of the information in the RFP, the Proposer must carefully read and review the attached sample contract (Section 6). The successful Proposer will be required to enter into a contract with Metro, which will be substantially similar to the sample provided. Therefore, the Proposer must submit any proposed changes to the sample contract with the proposal. Any requested changes must be made legibly and conspicuously. Page(s) on which the change(s) appear must be tabbed so as to be easily identified. The Proposer must also provide the rationale for any requested changes. If no changes are requested, the Proposer will be deemed to have accepted the sample contract language. If the Proposer requests changes, such requests will be considered in any negotiations with Metro. Failure to reach an agreement may result in Metro pursuing negotiations with the second highest ranked Proposer.

9. Disclosure of Investigations/Actions. Proposer must provide a detailed description of any investigation or litigation, including administrative complaints or other administrative proceedings, involving any public sector clients during the past five (5) years including the nature and status of the investigation, and, for any litigation, the caption of the action, a brief description of the action, the date of inception, current status, and, if applicable, the disposition.

10. Debarment

a. Proposer must certify that is not included in the "U. S. General Services Administration's List of

Parties Excluded from Federal Procurement or Non-procurement Programs." Proposer must include a completed certification in the form attached in Division 2 of the RFP Documents.

b. Proposer agrees to refrain from awarding any Subcontractor of any amount (at any tier) to a debarred or suspended subcontractor. Proposer must include with its Proposal a completed certification in the form attached in Division 2 of the RFP Documents from each Subcontractor (at any tier) seeking a contract exceeding $25,000.

c. Proposer agrees to provide Metro with a copy of each conditioned debarment or suspension certification provided by a prospective Subcontractor at any tier, and to refrain from awarding a subcontract with any party that has submitted a conditioned debarment or suspension certification until FTA approval is obtained.

11. Lobbying

a. Pursuant to Public Law 104-65, the Proposer is required to certify that no Federal funds were used to influence or attempt to influence an officer or employee of any Federal department or agency, a member of Congress or State legislature, an officer or employee of Congress or State legislature, or an employee of a member of Congress or State legislature regarding the project(s) included in this contract.

b. Proposers who use non-Federal funds for lobbying on behalf of specific projects or proposals must submit disclosure documentation when these efforts are intended to influence the decisions of Federal officials. If applicable, Standard Form-LLL, "Disclosure Form to Report Lobbying", is required with the Proposer's first submission initiating the Metro's consideration for a contract. Additionally, Disclosure forms are required each calendar quarter following the first disclosure if there has been a material change in the status of the previous disclosure. A material change includes: 1) a cumulative increase of $25,000 or more in the amount paid or expected to be paid for influencing or attempting to influence a covered Federal action; 2) a change in the person(s) or individual(s) influencing or attempting to influence a covered Federal action; or 3) a change in the officer(s) or employee(s) or Member(s) contacted to influence or attempt to influence a covered Federal action.

c. The Proposer is required to obtain the same certification and disclosure from all subcontractors (at all tiers) when the Federal money involved in the subcontract is $100,000 or more. Any disclosure forms received by the Proposer must be forwarded to Metro.

12. Employee Eligibility Verification

a. The Proposer is required by sworn affidavit and provision of documentation, to affirm its enrollment and participation in a Federal work authorization program with respect to employees working in connection with the contracted services.

b. The Proposer shall also affirm that it does not knowingly employ any person in connection with the contracted services who does not have the legal right or authorization under Federal law to work in the United States as defined in 8 U.S.C. §1324a(h)(3).

c. The Proposer is required to obtain the same affirmation from all subcontractors at all tiers.

13. Buy America

    a. To the extent applicable to the Work, Proposer agrees to comply with 49 U.S.C.§ 5323(j), and FTA's Buy America regulations at 49 C.F. R. Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in this project are produced in the United States, unless a waiver of these provisions is granted. General waivers are listed in 49 C.F.R. 661.7. Proposer must submit to Metro the appropriate Buy America certification with its Proposal unless subject to a general waiver. Proposals that are not accompanied by a completed Buy America certification found in Division 2 of this solicitation will be rejected as nonresponsive.

4.4 Proposal Submission Requirements – Cost Proposal

Metro anticipates awarding a stipulated sum contract – AIA Contract A-101 Standard Form of Agreement between Owner and Contractor, 2007 Edition and AIA Document A-201, 2007 General Conditions (modified to include Federal Transit Administration and Metro Contract Conditions. A proposal response form/itemized BID sheet has been provided in Division 2. DO NOT DEVIATE FROM THE USE OF THIS FORM.

A. The Cost Proposal shall be submitted in a separate, sealed envelope per RFP Instructions. **DO NOT INCLUDE COST PROPOSAL with other Submitted Proposal Documents – Separate Technical and Contractual Submissions per Section 4.3.**

B. The costs included in the cost proposal should include all items of labor materials, and other costs necessary to perform the contract further explained in Division 3 – Supplemental Conditions. Transportation costs, offloading, installation and other costs associated with the delivery and ultimate installation of fabricated equipment should be included in price proposal. Any items omitted from this RFP which are clearly necessary for the completion of the work being proposed should be considered part of the work though not directly specified or called for in this RFP.

C. Proposer understands that pay applications submitted for this project work shall identify subcontractors, if applicable, the amount of payment to the subcontractor for each pay application period as well as cumulative total paid to the subcontractor for the term of the contract. If subcontractor is certified as Disadvantaged Business Enterprise (DBE) this shall be identified on the Subcontractor Utilization Form submitted with each monthly payment application.

4.5 Basis for Contract Award

A. This is a “Best Value,” competitive, negotiated source selection. Award of contract, if made, will be made to the responsive and responsible Proposer whose offer conforming to the solicitation is judged by an integrated assessment of the evaluation criteria to be the most advantageous to Metro, price/cost and other factors considered.

B. Prior to the issuing Notice-of Intent to Award the Contract, Metro will review and evaluate each of those Proposals applying the criteria and requirements of the RFP Documents. Without limitation to any other Governmental Requirement, to be determined “responsible”, a Proposer must possess at the time of the award of the Contract the ability to perform successfully and a willingness to comply with the terms and conditions of the Contract, including (i) the financial resources adequate to perform the Contract, or the ability to obtain them; (ii) the ability to meet the required delivery or performance schedule, taking into

consideration all existing commercial and governmental business commitments; (iii) a satisfactory performance record; (iv) a satisfactory record of integrity and business ethics; (v) the necessary organization, experience, accounting, and operational controls, and technical skills, or the ability to obtain them;(vi) compliance with applicable licensing and tax laws and regulations; (vii) the necessary production, construction, and technical equipment and facilities, or the ability to obtain them; (viii) compliance with Affirmative Action and Disadvantaged Business Program requirements; and (ix) any other qualifications and eligibility criteria necessary to receive an award under any Governmental Requirement.

Notwithstanding anything contained in the RFP Documents to the contrary and without limitation to any additional right of Metro in respect of such matters, Metro reserves the right to deem any Proposer as not responsible if: such Proposer has failed to comply with any requirements of the RFP Documents, including any pre-qualification requirements cited therein as a requirement or condition of the submission of a Proposal; whether the Proposer has failed to pay, or satisfactory settle, any amount to due for labor and materials in connection with a current contract with Metro as of the Submission Deadline; or the Proposer was declared to be in default in any previous contract with Metro that was not resolved to the reasonable satisfaction of Metro or whose work in a prior contract with Metro was otherwise found by Metro to be deficient or otherwise not satisfactory, as reasonably determined by Metro.

C. Metro may select other than the lowest cost/priced, technically acceptable offer if it is determined that the additional technical merit offered is worth the additional cost in relation to other proposals received. Metro is more concerned with obtaining excellent technical features than with making an award at the lowest overall cost/price to the Authority. However, Metro will not make an award at a significantly higher overall cost to achieve only slightly superior technical features.

D. Proposers are further cautioned that Metro may not necessarily make an award to the Proposer with the highest technical ranking if doing so would not represent the best value to Metro. For evaluation purposes, if proposals become more technically equivalent, than cost/price becomes more important and may be the deciding factor.

4.6 Technical Proposal Evaluation Criteria

A. Proposals will be evaluated by an Evaluation Committee on the basis of the following weighted criteria.

40% -Cost/Price
20% -Production Resources and Capability/Scheduling
20% - Past Performance and References
20% -Experience/Qualifications

4.7 Bonding Requirements (Construction and Facility Improvements)

A. A proposal/RFP bond in the amount of five percent (5%) of the full expected cost of services to be performed, reflected in U.S. dollars, must be enclosed in the original cost proposal envelope.

B. The bond must be written by a licensed surety firm. Failure to submit a bond with the proposal will result in the proposal being considered non-responsive.

C. As a condition to the Contract, the successful Proposer will be required to furnish a performance bond

and a separate labor and material payment bond, each in the amount of 100% of the Contract Amount (reflected in United States Dollars), each made payable to the Transit Authority of the City of Omaha. The Contract will require that each bond shall be delivered to Metro contemporaneously with Contractor's execution of the Contract and cannot be dated prior to the date of the award of the Contract The performance bond shall be security for Contractor's full and faithful performance of the Contract. The labor and material payment bond shall be security for Contractor's payment of all persons, firms or corporations to whom Contractor may be liable for labor, materials, tools, equipment and other services in respect of the performance of the Work and as may otherwise be required by Neb. Rev. Stat Section 52-118. A maintenance bond will also be required for a two (2) year period from the date of Substantial Completion. The form of each bond must be that provided within the Project Manual.

D. Bonds shall be issued by a surety authorized to do business in the State of Nebraska that is listed in the current issue of the most recent revision of the United States Treasury Circular 570. The bonds, for the life of the Contract, shall be maintained to reflect additional values incorporated by approved Change Orders. A current power of attorney for the person signing the bond as a representative of the surety must be attached to the bonds. If specifically requested by Metro, the successful Proposer shall obtain and submit information on the surety's financial strength rating.

4.8 Presentations/Interviews/Written Responses

A. After the submission of proposals, selected Proposers with the highest evaluation score(s) may be invited to interview with the evaluation committee concerning its technical proposal. The evaluation committee may also require a Proposer(s) to submit written responses to questions regarding its proposal.

B. Proposers selected for interview will be notified by telephone and follow up letter to advise of date and time. Interviews are tentatively scheduled for September 11th and 12th, 2018. Selected Proposers will be informed as to the exact time and other details regarding the interview.

4.9 Negotiations & Best and Final Offers

A. Additional contract negotiations may be required with the highest ranked Proposers prior to final contract award. Metro may solicit a Best and Final Offer (BAFO) from one or more Proposers. Metro may or may not contact all Proposers to negotiate and/or to submit a BAFO.

B. After receipt of the results of the proposal evaluations, interviews, and BAFO(s), if applicable, the evaluation committee will complete its evaluation and recommend for award to the responsive and responsible Proposer(s) judged to provide the best value to Metro.

DIVISION 3-

SUPPLEMENTAL CONDITIONS

SUPPLEMENTARY CONDITIONS

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SUPPLEMENTARY CONDITIONS

(Special Conditions)

1. **START DATE.** The Project work shall be commenced within TEN (10) days after the issuance of the Notice to Proceed. Anticipated start date is October 8, 2018. Notice to Proceed will be given once METRO's Representative consults with the CONTRACTOR and verifies that he is in compliance with these specifications for submittals of shop drawings, schedule, safety plan, etc.

2. **CONTRACT TIME AND PHASING.** The Omaha Rapid Bus Transit Station Canopy Package project will be completed by 12 months after the Notice to Proceed is granted. The Contractor shall notify Metro 7 days prior to delivery of Station Canopies to site for installation.

3. **NOT USED**

4. **DEFINITIONS AND MATERIALS REFERENCES**. All references to "inspection" and "inspector" shall be replaced with "observation" and "observer" respectively. The phrases "Special Provisions" and "Special Conditions" are interchangeable and are considered to be the same document. Reference in these RFP Documents to any material or method of construction by propriety name, make, or catalog number is done to establish a standard of quality and not to limit competition. The Contractor may, at his option, use any other material, system, or method of construction, which, in the judgment of Metro's Representative, is equal to that name. Request must be made in writing and to receive consideration for substitution, full information must be furnished to ensure that no redesign of the project will be necessary.

5. **CONSTRUCTION SCHEDULE.** Prior to the preconstruction conference, the Contractor shall submit to Metro's Representative for approval a complete work schedule, including a list of Subcontractors and the work that they will perform. As a minimum, the schedule shall provide information on the sequence of work activities, milestone dates, and activity duration.

   The schedule shall reflect a minimum of interruptions tobusinesses adjacent to the station canopy installations. The Contractor will be required to accomplish the work items according to the schedule of construction as submitted to Metro's Representative.

   The Contractor shall maintain the work schedule and provide an update and analysis of the progress schedule once a month, or as otherwise requested by Metro's Representative. Submission of the work schedule shall not relieve the Contractor of overall responsibility for scheduling, sequencing, and coordinating all work to comply with the requirements of the contract.

6. **PRECONSTRUCTION CONFERENCE**. After the Notice to Proceed has been issued and prior to commencement of any work Metro's representative will meet with the Contractor, and the subcontractors (as appropriate) to discuss the work in general. Discussion will include administrative matters, accident prevention, safety precautions, answer any questions of Metro's Representative or Contractor, and to resolve any potential problems before the work commences.

7. **HAUL ROADS, ACCESS POINTS, AND STORAGE**: The Contractor shall access the project only via the access points and haul routes authorized by Metro's Representative. Haul routes will not be allowed over new pavement. Any haul route over existing pavement shall be protected. Equipment may be parked and material stored only in locations approved by Metro's Representative. The exact location of haul routes, parking and storage areas shall be determined by Metro's Representative prior to the start of construction.

   The haul routes shall be utilized for all equipment traffic and the equipment shall not be allowed to stray or wander away from the established routes. The haul roads shall be the responsibility of the Contractor and shall be maintained and kept in good order at all times. Water, when required shall be applied at the locations and in the

amounts necessary to minimize dust and dirt. The Contractor shall repair any damage caused by the movement of equipment on any of the haul roads, whether in designated or undesignated areas.

All areas used for haul routes, access, storage and parking shall be restored to their original condition by the Contractor, including seeding, at no expense to Metro.

The performance of any work as specified by this provision, including watering, maintenance, and repair of the haul roads, shall not be measured and paid for directly, but shall be considered as necessary and incidental to the work.

8. **COSTS OF TESTING.** In general, acceptance testing (as defined in the Specifications and exclusive of any retesting) will be paid for by Metro. Any retesting necessitated by noncompliance with the specification requirements may result in an amount, equal to the cost of retesting, being deducted and retained, from subsequent estimates due the Contractor, at the discretion of Metro's Representative. In general, preparation of mix designs and quality control testing will be the responsibility of the Contractor. See each specific specification for identification of the Contractor's testing responsibilities.

9. **PERMITS AND COMPLICANCE WITH LAWS.** The Contractor shall procure and pay for all building permits, licenses and bonds necessary for the prosecution of his work, and/or required by Local, State and Federal regulations and laws, as pertains particularly to permits and transportation of materials and equipment, or other operations which are not specific requirements of these specifications. The Contractor shall give all notices, pay all fees, and comply with all Federal, State, and Local laws, ordinances, rules, and regulations, and building and construction codes bearing on the conduct of the work.

10. **STORM WATER AND GRADING PERMITS.** The Contractor and his Subcontractors shall comply with all terms and conditions of the storm water permit and grading permits (if required) through the City of Omaha and Nebraska Department of Environmental Quality (NDEQ).

11. **FINAL PAYMENT.** On satisfactory completion of all items as called for in the contract and in accordance with the approved plans and specifications, the Contractor shall furnish to Metro a written clearance from the Nebraska Department of Labor, certifying that all payments then due for contributions or interest on wages paid to individuals employed in the performance of this contract have been made by the Contractor or his Subcontractor to the Unemployment Compensation Fund. Upon receipt of the above clearance, the Contractor will be eligible to receive final payment for the contract, less previous progress payments.

    Minor errors or omissions in the plans, proposal or specifications, shall not relieve the Contractor from the fulfillment of the general intent of the contract to satisfactorily complete any item or items called for in the plans, specifications and proposal form.

12. **CLEAN UP AND DISPOSAL.** All waste and removed material produced as a result of the Contractor's operations and not reused in the project shall be cleaned up and disposed of off the property by the Contractor at no expense to Metro. This includes removal of all erosion control features.

13. **GUARANTEE.** All Work shall be performed in a good and workman like manner using highest industry standards and in accordance with good construction practices and pursuant to, subject to, and in conformity with the Contract Documents. Contractor warrants that (a) all materials, supplies and equipment furnished in respect of Work will be new and of good quality unless otherwise expressly permitted by the Contract Documents, (b) all Work will be free from defects not inherent in the quality required or permitted and will otherwise conform to the Contract Documents, as evidenced by Contractor to the satisfaction of Metro whenever requested by Metro, and (c) Contractor shall repair, replace, correct or otherwise remediate any deficient, defective or non-conforming Work for a period of two years from Metro's acceptance of all Work, or such longer period as may be applicable by application of provision of any of the other Contract Documents. During the warranty period, Contractor shall

repair, replace, correct or otherwise remediate any deficient, defective or non-conforming Work at its own expense. All corrected Work shall carry an additional one year warranty period, beginning on the date on which the Metro accepts the corrected Work.

Acceptance of any portion of the Work prior to final acceptance shall not release Contractor from liability for faulty workmanship or materials or for failure to fully comply with all of the terms of the Contract. Metro reserves the right and shall be at liberty to inspect all Work any time and shall have the right to reject all materials and workmanship which do not conform with the Contract Documents; provided, however, that Metro is under no duty to make such inspection, and no inspection so made shall relieve Contractor from any obligation to furnish any Work as required by the Contract Documents.

14. **INSURANCE.** As a condition to the Contract, the successful Proposer will be required to procure policies of insurance and deliver certificates thereof to Metro, in each case meeting all requirements of, and as and when required by, the RFP Documents.

15. **SALES TAX**. Metro is exempt from payment of federal excise and transportation tax and any sales and use taxes otherwise applicable under the Laws. No such taxes shall be included in the Contract Amount or any unit or other price required to be identified in the Cost Proposal. By submission of its Proposal, Proposer acknowledges that it has taken into consideration and made allowances for all of the ordinary delays and hindrances incident to the Work, whether because of delays in procuring equipment, materials, workers or other causes and that Proposer must undertake and complete the Project and the Work as and when required by the RFP Documents. Metro will furnish the CONTRACTOR a "Purchaser Agent Appointment" Form 17 for use in purchasing materials.

16. **CONSTRUCTION REFERENCE STAKING.** For this project Metro will furnish a minimum of initial control stakes and bench marks for the improvements. Contractor shall protect all control staking and shall pay the cost of replacing all stakes or grade information lost due to vandalism or otherwise. Said construction reference staking shall be furnished, one time only, by Metro. Contractor is responsible for all construction staking other than the control stakes furnished by Metro.

    Any costs incurred by Metro due to a Contractor requesting additional surveying may be deducted from the Contractors' Progress Estimates at the discretion of Metro's Representative.

17. **MEASUREMENTS AND PAYMENTS.** Specifications that provide for separate direct payment for items except those listed in the proposal are void.

    Items that are to be removed and not reused in the work or not designated to be furnished to Metro are to become the property of the Contractor unless otherwise specified. Any salvage value the items may have shall be reflected in the unit prices.

    Items that do not have a specific specification section but are rather detailed on the drawings require a method of measurement and basis of payment are the following:

    OMAHA RAPID BUS TRANSIT STATION CANOPY PACKAGE

    Item 1 – Mobilization- Mobilization shall be measured as a lump sum and paid for at the contract unit price. Mobilization will include bond costs, insurance costs, sanitary facilities, and other incidentals for the complete construction of the project.

    Item 2 – Platform Type A – Canopy Structure and Items Above- Platform Canopy Type A shall be measured as a lump sum and paid for at the contract unit price. Platform Canopy Type A – Canopy Structure and Items above will include all labor, materials, and accessories necessary to furnish and install station canopies and installation of owner furnished items. Including but not limited to: fabricated structural steel columns, roof beams, brackets and

edge beams, fascias with gutter and recessed lighting, downspouts, roof glazing and wind screens, wall pack lighting, custom luminaires, lights on station name sign, station name signs on signage pillar/canopy, decals on the windscreens, aluminum logos on the canopy and signage pillars, emergency phones, wiring from power/communication cabinet to each canopy feature for power distribution and data. Installation of owner furnished items including next bus signs, wireless routers, and cameras. Providing anchor bolts for the shelter building and wind screens to the roadway contractors.

Item 3 – Platform Type A1 – Canopy Structure and Items Above- Platform Canopy Type A1 shall be measured as a lump sum and paid for at the contract unit price. Platform Canopy Type A1 – Canopy Structure and Items above will include all labor, materials, and accessories necessary to furnish and install station canopies and installation of owner furnished items. Including but not limited to: fabricated structural steel columns, roof beams, brackets and edge beams, fascias with gutter and recessed lighting, downspouts, roof glazing and wind screens, wall pack lighting, custom luminaires, lights on station name sign, station name signs on signage pillar/canopy, decals on the windscreens, aluminum logos on the canopy and signage pillars, emergency phones, wiring from power/communication cabinet to each canopy feature for power distribution and data. Installation of owner furnished items including next bus signs, wireless routers, and cameras. Providing anchor bolts for the shelter building and wind screens to the roadway contractors.

Item 4 – Platform Type A2 – Canopy Structure and Items Above- Platform Canopy Type A2 shall be measured as a lump sum and paid for at the contract unit price. Platform Canopy Type A2 – Canopy Structure and Items above will include all labor, materials, and accessories necessary to furnish and install station canopies and installation of owner furnished items. Including but not limited to: fabricated structural steel columns, roof beams, brackets and edge beams, fascias with gutter and recessed lighting, downspouts, roof glazing and wind screens, wall pack lighting, custom luminaires, lights on station name sign, station name signs on signage pillar/canopy, decals on the windscreens, aluminum logos on the canopy and signage pillars, emergency phones, wiring from power/communication cabinet to each canopy feature for power distribution and data. Installation of owner furnished items including next bus signs, wireless routers, and cameras. Providing anchor bolts for the shelter building and wind screens to the roadway contractors.

Item 5 – Platform Type A3 – Canopy Structure and Items Above- Platform Canopy Type A3 shall be measured as a lump sum and paid for at the contract unit price. Platform Canopy Type A3 – Canopy Structure and Items above will include all labor, materials, and accessories necessary to furnish and install station canopies and installation of owner furnished items. Including but not limited to: fabricated structural steel columns, roof beams, brackets and edge beams, fascias with gutter and recessed lighting, downspouts, roof glazing and wind screens, wall pack lighting, custom luminaires, lights on station name sign, station name signs on signage pillar/canopy, decals on the windscreens, aluminum logos on the canopy and signage pillars, emergency phones, wiring from power/communication cabinet to each canopy feature for power distribution and data. Installation of owner furnished items including next bus signs, wireless routers, and cameras. Providing anchor bolts for the shelter building and wind screens to the roadway contractors.

Item 6 – Platform Type A4 – Canopy Structure and Items Above- Platform Canopy Type A4 shall be measured as a lump sum and paid for at the contract unit price. Platform Canopy Type A4 – Canopy Structure and Items above will include all labor, materials, and accessories necessary to furnish and install station canopies and installation of owner furnished items. Including but not limited to: fabricated structural steel columns, roof beams, brackets and edge beams, fascias with gutter and recessed lighting, downspouts, roof glazing and wind screens, wall pack lighting, custom luminaires, lights on station name sign, station name signs on signage pillar/canopy, decals on the windscreens, aluminum logos on the canopy and signage pillars, emergency phones, wiring from power/communication cabinet to each canopy feature for power distribution and data. Installation of owner furnished items including next bus signs, wireless routers, and cameras. Providing anchor bolts for the shelter building and wind screens to the roadway contractors.

Item 7 – Platform Type B – Canopy Structure and Items Above- Platform Canopy Type B shall be measured as a

lump sum and paid for at the contract unit price. Platform Canopy Type B – Canopy Structure and Items above will include all labor, materials, and accessories necessary to furnish and install station canopies and installation of owner furnished items. Including but not limited to: fabricated structural steel columns, roof beams, brackets and edge beams, fascias with gutter and recessed lighting, downspouts, roof glazing and wind screens, wall pack lighting, custom luminaires, lights on station name sign, station name signs on signage pillar/canopy, decals on the windscreens, aluminum logos on the canopy and signage pillars, emergency phones, wiring from power/communication cabinet to each canopy feature for power distribution and data. Installation of owner furnished items including next bus signs, wireless routers, and cameras. Providing anchor bolts for the shelter building and wind screens to the roadway contractors.

Item 8 – Platform Type B2 – Canopy Structure and Items Above- Platform Canopy Type B2 shall be measured as a lump sum and paid for at the contract unit price. Platform Canopy Type B2 – Canopy Structure and Items above will include all labor, materials, and accessories necessary to furnish and install station canopies and installation of owner furnished items. Including but not limited to: fabricated structural steel columns, roof beams, brackets and edge beams, fascias with gutter and recessed lighting, downspouts, roof glazing and wind screens, wall pack lighting, custom luminaires, lights on station name sign, station name signs on signage pillar/canopy, decals on the windscreens, aluminum logos on the canopy and signage pillars, emergency phones, wiring from power/communication cabinet to each canopy feature for power distribution and data. Installation of owner furnished items including next bus signs, wireless routers, and cameras. Providing anchor bolts for the shelter building and wind screens to the roadway contractors.

18. **OPERATIONAL SAFETY DURING CONSTRUCTION.** The Contractor shall submit a Safety Plan for each sequence of work for approval by Metro and Metro's Representative to assure compliance with the safety provisions.

The Contractor's plan should include, but not be limited to, a plan sheet(s) showing work area limits, access points, haul routes, equipment and material storage area(s), employee parking area(s), barricades, and sign locations.

The Contractor shall be responsible for all signing, barricades, and safety requirements as set forth by these specifications. The Contractor is responsible for its own safety and any review of its safety plan by Metro's Representative does not change this responsibility.

The Contractor shall implement all necessary safety plan measures prior to commencement of any work activity. The Contractor shall conduct routine checks of the safety plan measures to assure compliance with the safety plan measures.

The Contractor is responsible to Metro for the conduct of all Subcontractors it employs on the project. The Contractor shall assure that all Subcontractors are made aware of the requirements of the safety plan and that they implement and maintain all necessary measures.

No deviation or modifications may be made to the approved safety plan unless approved in writing by Metro or Metro's Representative.

19. **SHOP DRAWING SUBMITTALS.** The Contractor shall submit shop drawings for the following items prior to installation/construction of each item.

Site Work-
1. Barricading Plan

Architectural-
1. As per requirements of technical specifications

Structural-
1. As per requirements of technical specifications

Mechanical-

1. As per requirements of technical specifications

Electrical-

1. As per requirements of technical specifications

20. CERTIFICATES AND TESTING. The Contractor shall submit certificates and test results for the following items:

Certificates-

1. As per requirements of technical specifications

Testing-

1. As per requirements of technical specifications

END OF DIVISION 3 – SUPPLEMENTAL CONDITIONS

DIVISION 4-

WAGE RATES (Davis-Bacon)

General Decision Number: NE180057 07/13/2018 NE57

Superseded General Decision Number: NE20170057

State: Nebraska

Construction Type: Building
BUILDING CONSTRUCTION INCLUDING WORK ON INDUSTRIAL SITES

County: Douglas County in Nebraska.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.35 for calendar year 2018 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.35 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2018. The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2018
1	02/02/2018
2	04/06/2018
3	07/13/2018

BRNE0001-001 05/31/2017

	Rates	Fringes
BRICKLAYER	$ 28.18	15.60

CARP0427-001 06/01/2017

	Rates	Fringes
CARPENTER (Including Acoustical Ceiling Installation)	$ 25.91	13.15

CARP0427-004 06/01/2017

	Rates	Fringes

CARPENTER (Drywall Hanging,
Finishing/Taping Only).....$ 25.91 13.15

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* ELEC0022-001 06/01/2018

	Rates	Fringes
ELECTRICIAN.....	$ 35.90	15.74

ELEV0028-001 01/01/2018

	Rates	Fringes
ELEVATOR MECHANIC.....	$ 43.10	32.645+a+b

FOOTNOTE:
a. Vacation Pay: 8% for persons with 5 or more years of service, 6% for persons with less than 5 years of service.
b. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, Friday after Thanksgiving, and Christmas Day.

ENGI0571-004 10/01/2013

	Rates	Fringes
OPERATOR: Crane.....	$ 27.08	10.69
OPERATOR: Forklift.....	$ 21.70	10.69

IRON0021-002 06/01/2017

	Rates	Fringes
IRONWORKER, STRUCTURAL.....	$ 29.09	15.52

LABO1140-003 06/01/2017

	Rates	Fringes
LABORER (Mason Tender, Brick & Hod).....	$ 21.69	9.40

PLUM0016-003 05/07/2017

	Rates	Fringes
PLUMBER (Excluding HVAC Pipe Installation).....	$ 33.85	13.31

PLUM0464-006 05/29/2016

	Rates	Fringes
PIPEFITTER (Includes HVAC Pipe Installation and Excludes HVAC System Installation).....	$ 35.04	16.44

SFNE0669-001 04/01/2017

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers)	$ 34.75	15.84

SHEE0003-001 07/01/2015

	Rates	Fringes
SHEET METAL WORKER (Including HVAC Duct & System Installation)	$ 32.89	14.93

SUNE2011-031 10/27/2011

	Rates	Fringes
CAULKER	$ 17.13	0.00
CEMENT MASON/CONCRETE FINISHER	$ 18.44	4.08
ELECTRICIAN (Low Voltage Wiring)	$ 21.54	5.99
FORM WORKER	$ 19.07	3.84
GLAZIER	$ 17.67	1.71
LABORER: Common or General	$ 15.47	5.34
OPERATOR: Backhoe/Excavator/Trackhoe	$ 22.55	5.72
OPERATOR: Bobcat/Skid Steer/Skid Loader	$ 23.11	0.91
OPERATOR: Loader	$ 20.76	4.64
PAINTER: Brush, Roller and Spray	$ 14.26	0.00
ROOFER	$ 13.57	0.77
TRUCK DRIVER, Includes Dump and Tandem Truck	$ 14.77	1.41

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any

solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average

rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

==========

END OF GENERAL DECISION

DIVISION 5-

SAMPLE FORMS

REQUEST FOR CLARIFICATION

Project Name: Omaha Rapid Bus Transit Station Canopy Package Date: _____

Company Name: _____ Page No: _____

Document Reference (check one):
General Requirements: ____
Specifications: _____
Section Number:_____
Section Title:_____
Construction Drawings: _____
Sheet Number and Name: _____

PROPOSER'S REQUEST:

METRO RESPONSE:

Approved _____ Denied _____

Metro Comments:

_____ _____

Metro Authorized Signature Date of Response
Grant Administrator
Metro Transit, 2222 Cuming Street, Omaha, NE 68102 jrumery@ometro.com

Performance Bond

KNOW ALL MEN BY THESE PRESENTS: That_____as Principal, and_____, as Surety, are held and firmly bound onto the Transit Authority of the City of Omaha d/b/a Metro, hereinafter referred to as Metro, and _____ hereinafter referred to as _____. jointly and severally, in the penal sum of _____for payment of which well and truly to be made we do hereby jointly and severally bind ourselves, our heirs, executors, administrators, personal representative, successors and assigns.

WHEREAS, the aforesaid Principal is about to *enter, or has entered into a contract with Metro whereby said Principal agrees to *construct:

Omaha Rapid Bus Transit Station Canopy Package NE-79-X001 hereinafter referred to as "construction work":

The conditions of the above obligation are such that, whereas the above named Principal desires permission from Metro to perform the above stated construction work.

NOW, THEREFORE, INCONSIDERATION of being permitted by Metro to perform said construction work, said Principal does hereby agree as follows:

1. To well and faithfully perform all of Principal's obligations regarding and pertaining to said construction work.

2. To comply with the Plans and Specifications pertaining to said construction work and Metro of any other's concerned with or affected by the performance and execution of said construction work and to comply with and faithfully observe and obey all applicable Rules and Regulations of Metro now existing relating to the performance of said construction work and any work done pertaining thereto.

3. At all times during the progress of the work, the Principal shall have at said construction a representative authorized to take orders and act in the Principal's place.

4. During the period guaranty, to promptly attend to repairs and maintenance.

5. To observe all laws and City Ordinances relating to obstructing streets, maintaining signals, keeping open passageways, protecting the same where exposed, and pertaining to those engaged in the performance of such construction work.

6. To fully protect, indemnify, and save harmless Metro and their employees, and their successors from all expenses, costs, claims, demands, suits, judgments, exactions, executions, and liabilities of every name and description for or on account of any injuries or damages received or sustained by an party or parties in any way connected with, relating to , or growing out of the aforesaid construction work and any work pertaining thereto, or on account of any acts, negligence, or failure of the Principal hereunder or any of Principal's servants, agents, or subcontractors or other acting for Principal or under Principal's direction or in said construction work or any work pertaining thereto, or on account of any claims of damage for infringement of any patent in fulfilling the obligations of the Principal.

7. To furnish all material and work in a conformity with the specifications and in a workmanlike manner to the satisfaction of Metro and Metro's Representative the same shall have the right: to inspect all materials and work, and to take samples of materials for testing purposes.

8. To place all materials for said construction work on the streets and in the ground in such manner as not to impede traffic.

9. To remove all remnants and waste upon completion of the construction work.

10. To perform, without expense to the obliges, any appurtenant work not specified in the aforesaid contract which may be fairly implied as included therein which Metro, shall judge to be fairly implied as included in said construction work.

11. Upon being so directed by Metro or Metro's Representative, to remove or to reconstruct, or to make good at the Principal's own cost, any work which Metro or Metro's Representative, or shall decide defective. Any omission to condemn any work at the time of its construction shall not be construed as an acceptance of any defective work by Metro or Metro's Representative and Principal shall correct any imperfect work whenever discovered within the guarantee period.

12. To protect control stakes and to be held responsible for any defective work occasioned by failure or negligence to do so.

13. To maintain in continuous good condition, satisfactory to Metro any and all work constructed by Principal under the aforesaid construction for a period of (1) ONE YEAR from and after the aforesaid acceptance by Metro.

14. To pay or cause to be paid as and when due all contributions and interest to the Unemployment Compensation Fund of the State of Nebraska from Principal or an Contractor or Sub-Contractor because of or in any way arising out of said construction work; and to fully protect, indemnify, and save harmless Metro and their employees from any and all payments of contributions, interest, or penalties, due or to become due to the Unemployment Compensation Fund of the State of Nebraska from Principal or any Contractor or Sub-Contractor because of or in any way arising out of said construction work.

15. If at any time within the period of the guarantee any of the aforesaid work shall, in the judgment of Metro or Metro's Representative require repair, or reconstruction, Metro or Metro's Representative shall notify the Principal to make the required repairs or to do the required work, and if said Principal shall neglect to proceed therewith promptly after service of such notice upon the Principal than Metro shall notify the Surety who shall promptly do such work. The word "promptly", as used in this paragraph shall mean as soon as possible, in situations, which threaten life or property; as soon as practical, in other situations.

16. At the expiration of the aforesaid period of guarantee applicable to any of said work done or caused to be done by Principal, the Principal and the Surety shall be released provided that the said work is in good and proper condition at the expiration of said period of guarantee and provided, further , that it shall be the duty of the Principal, or the Surety at its election, to arrange with Metro, no sooner than 30 days prior to the expiration of the guarantee period, for an inspection of the aforesaid work and, unless the Principal or Surety shall make such arrangements are made, the inspection conducted and a final certificate as to the good and proper condition of all of the aforesaid work shall have been duly issued or approved by Metro alone. If the Principal or Surety does not cause such an inspection to be made at the Principal's or Surety's expense before three months following the expiration of the guarantee period then Metro may make such an inspection at its own initiation. Any inspection conducted by Metro, whether at its own initiation or as arranged for by the Principal, shall be paid for in full by the Principal and Surety, or either of them.

17. To make payment in full for the material use, for all laborers and mechanics for labor that shall be performed upon all of the aforesaid work and for material and equipment rental which is actually used or rented in construction work or in the performance of the contract.

18. To furnish to Metro a photo static copy of an applicable contract or an executed duplicate original thereof, and such other instruments or documents pertaining to said construction work as it may require.

19. No payment by Principal or Surety under the provisions of this Bond shall be made other than to Metro, to any obligee name herein, without prior approval by Metro.

20. **Principal and Surety are jointly and severally liable under the provisions hereof and action against either or both may proceed without prior action against the other, and both may be joined in one action.

NOW, THEREFORE, the condition of this obligation is such that, if said Principal shall well and faithfully perform all of the Principal's obligations as foresaid, then these presents shall become void, other wise to remain in full force and effect.

IN WITNESS WHERE OF, we have hereunto set our hands this ___day of _____, 20___.
IN PRESENCE OF:

SURETY:

_____.
Company Name

_____
Signature of Attorney in Fact

PRINCIPAL:

_____
Company Name

_____
Signature of Company President

RESIDENT AGENT:

_____
Name

_____
Address

_____
City, State, Zip

_____
Signature of Resident Agent

WITNESS:

_____
Name

_____
Address

_____
City, State, Zip

_____
Signature of Witness

LABOR AND MATERIAL PAYMENT BOND

(This Bond is issued simultaneously with Performance Bond in favor of Metro conditioned on the full and faithful performance of the Contract.)

KNOW ALL MEN BY THESE PRESENTS: that _____ as Principal, hereinafter called Contractor, and _____ as Surety, hereinafter called Surety, are held and firmly bound unto **The Transit Authority of the City of Omaha d/b/a Metro, 2222 Cuming Street, Omaha, NE 68102**, hereinafter called Metro, for the use and benefits of claimants as herein below defined, in the amount of **_____,** for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has by written agreement dated_____, entered into a contract with Metro for the **Omaha Rapid Bus Transit Station Canopy Package, NE-79-X001, Various locations along Nicholas Street, Dodge Street, and Douglas Street, Omaha, NE** in accordance with Drawings and Specifications prepared by Metro's Representative, which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if Contractor shall promptly make payment to all claimants as hereinafter defined, for all labor and material used or reasonably required for use in the performance of the Contract, then this obligation shall be void; otherwise it shall remain in full force and effect, subject, however, to the following conditions:

1. A claimant is defined as one having a direct contract with the Contractor or with a Subcontractor of the Contractor for labor, material, or both, used or reasonably required for use in the performance of the Contract, labor and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental or equipment directly applicable to the Contract.

2. The above named Contractor and Surety hereby jointly and severally agree with Metro that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, or materials were furnished by such claimant, may sue on this bond for the use of such claimant, prosecute the suit to final judgement for such sum or sums as may be justly due claimant, and have execution thereon. Metro shall not be liable for the payment of any costs or expenses of any such suit.

3. No suit or action shall be commenced hereunder by any claimant;

   a) Unless claimant, other than one having a direct contract with the Contractor, shall have given written notice to any two of the following: The Contractor, Metro, or the Surety above named, within one hundred eighty (180) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Contractor, Metro or Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need not be made by a public officer.

   b) After the expiration of one (1) year following the date on which Contractor ceased Work on said Contract, it being understood, however, that if any limitation embodied in this bond is prohibited by any law controlling the construction hereof such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

c) Other than in a state court of competent jurisdiction in and for the county or other political subdivision of the state in which the project, or any part thereof, is situated, or in the United States District Court for the district in which the project, or any part thereof, is situated, and not elsewhere.

4. The amount of this Bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics' liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under and against this Bond.

THE GENERALITY OF OTHER SECTIONS of this Bond shall not in any way be limited by the following:

It is expressly understood and agreed that this Bond is given to secure and does secure payment by the said bounden Contractor of all just claims for material, supplies, tools, fuel, lubricants, equipment, equipment rental, machinery, insurance premiums, and services used or consumed in the construction of the work by him or any of his subcontractors and for the payment to the Unemployment Compensation Fund of the State of Nebraska the unemployment contributions and interest due under the provisions of Nebraska Law on wages paid to individuals employed in the performance of this contract, and for all other just claims filed against the Contractor or any of his subcontractors in carrying out the provisions of this contract.

Contractor:_____ (Seal)

Title:_____

Surety:_____ (Seal)

Title:_____

Agent of Record: _____

Address of Agent of Record:

_____
_____

_____

Phone Number: _____

Address of Surety Company:

_____

Phone Number: _____

MAINTENANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that _____ as Principal, hereinafter called Contractor, and _____ as Surety, hereinafter called Surety, are held and firmly bound unto **The Transit Authority of the City of Omaha d/b/a Metro, 2222 Cuming Street, Omaha, NE 68102**, hereinafter called Metro, in the amount of _____Dollars and ___/100 *($_____),* for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

The Principal has constructed the Omaha Rapid Bus Transit Station Canopy Project as identified as NE-79-X001, in Omaha, Nebraska. These improvements were constructed according to final construction plans approved by Metro on July 27, 2018. The Principal agrees as a condition of final approval of said construction to warrant Metro that the construction is, and will remain for a period of two (2) years from the date of substantial completion, free from defects in materials and workmanship.

The condition of obligation is such that if Principal shall fully perform according to the terms of the final construction plans and the warranty described above, and if no claim on said warranty is unsatisfied at the conclusion of thirty days following the two-(2) year warranty period, then this obligation shall be void, otherwise to remain in full force and effect.

Project Name:_____ Date:_____

Principal:_____ Corporate Surety_____

By:_____ Address:_____

City, State, Zip:_____

By:_____

Title:_____

Date of Substantial Completion:_____

By:_____

CERTIFICATE AS TO CORPORATE CONTRACTOR

I, _____, certify that I am the (Assistant) Secretary of the corporation named as Contractor in the within bond; that _____, who signed the said bond on behalf of the Contractor was then _____ of said corporation; that I know his/her signature thereto is genuine; and that said bond was duly signed, sealed, and attested to for and in behalf of said corporation by authority of its governing body.

(Corporate Seal) _____

(Signature of Corporate Secretary or Assistant Secretary)

ACKNOWLEDGMENT OF CONTRACTOR

(If not a Corporation)

STATE OF _____)

County of _____):ss

On this _____ day of _____ in the year 20___, before me personally appeared _____, known to me to be the person who is described in, and who executed the within instrument, and acknowledged to me that he/she or they executed the same.

_____

My Commission Expires: (Signature of Notary Public)

Seal:_____

ACKNOWLEDGMENT OF SURETY

STATE OF _____)

County of _____):ss

On this _____ day of _____ in the year 20___, before me, a Notary Public, personally appeared _____, known to me to be the _____ of the corporation that is described in and that executed the within instrument, and acknowledged to me that such corporation executed the same, that he/she is _____ of the corporation described in and which executed the foregoing instrument; that he/she knew the seal of the corporation; that the seal affixed to said instrument was such corporate seal; that it was so affixed by order of the Board of Directors of said corporation; and that he/she signed his name thereto by like order.

_____

My Commission Expires: (Signature of Notary Public)

Seal:_____

POWER OF ATTORNEY TO BE ATTACHED

SUPPLEMENT TO
CERTIFICATE OF INSURANCE
(Liability Policies)
Standard Form No. 1198

This is to certify that the endorsements described below have been issued by the named insurance companies. This supplement does not extend coverage shown on any attached endorsements.

PROJECT: Omaha Rapid Bus Transit Station Canopy Package; NE-79-X001

METRO: The Transit Authority of the City of Omaha, d/b/a Metro, 2222 Cuming Street, Omaha, Ne 68102

ENGINEER: AECOM

NAMED INSURED - CONTRACTOR:

COMMERCIAL GENERAL LIABILITY INSURANCE

Insuring Company: _____ Address: _____

Policy No.: _____ Inception Date: _____ Expiration Date: _____

UMBRELLA EXCESS LIABILITY

Insuring Company: _____ Address: _____

Policy No.: _____ Inception Date: _____ Expiration Date: _____

AUTOMOBILE LIABILITY INSURANCE

Insuring Company: _____ Address: _____

Policy No.: _____ Inception Date: _____ Expiration Date: _____

The policy or policies have been endorsed to name Metro and Engineer as Additional Insured as respects to above named project only and as regards Contractors work only.

☐ Yes ☐ No

Endorsement [is] [is not] attached.

The policy or policies listed herein have been endorsed to provide that thirty (30) days prior notice by Registered Mail from the insuring Company (ies) shall be given to Metro and Engineer named in this certificate (and to _____) in the event of cancellation, non-renewal, reduction of limits or deletion of coverage of the policy (ies) by the insurer and that immediate notice to the same parties by Registered Mail shall be given in the event of cancellation, non-renewal, reduction of limits or deletion of coverage of the policies by the insured.

☐ Yes ☐ No

Endorsement [is] [is not] attached.

Are any of the above liability policies "claims made" type policies?

☐ Yes ☐ No

If yes, list policy Nos.

COVERAGE PROVIDED: (mark appropriate box)

	Yes	No
(1) Operations of Contractor	☐	☐
(2) Operations of Sub-Contractor (Contingent)	☐	☐
(3) Elevators, if any.....	☐	☐
(4) Contractual Liability to include coverage for "Hold Harmless Agreement" if such agreement is contained in the contract documents or a sub-contract (in addition to coverage afforded for "incidental contract" as defined in policy)	☐	☐

PROPERTY DAMAGE INCLUDES: (mark appropriate box)

	Yes	No
(1) Coverage for damage due to blasting	☐	☐
(2) Coverage for damage due to collapse.....	☐	☐
(3) Coverage for damage to underground facilities	☐	☐
(4) Broad Form Property Damage.....	☐	☐

Special limitations or conditions as respects entire policy: _____

_____

_____

(IF ENTRY IS MADE ON ABOVE 3 LINES, ATTACH A COPY OF POLICY EXCLUSIONS TO CERTIFICATE)

Dated at_____ on _____
by:

_____ _____
Insuring Company (ies) *Signature of Authorized Agent(s)

_____
Printed Name of Agent(s)

Telephone No. Of Agency: _____

Name and Address of Agency_____

DRAFT

AIA® Document A101™ – 2007

Standard Form of Agreement Between Owner and Contractor
where the basis of payment is a Stipulated Sum

AGREEMENT made as of the «» day of « » in the year « »
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

«The Transit Authority of the City of Omaha (Authority) »« »
«2222 Cuming Street »
«Omaha, Nebraska 68102 »
« »

and the Contractor:
(Name, legal status, address and other information)

« »
« »

for the following Project:
(Name, location and detailed description)

« »

The Architect:
(Name, legal status, address and other information)

«
« »

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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

AIA Document A201™–2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.
(Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

« »

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

«N/A »

§ 3.2 The Contract Time shall be measured from the date of commencement.

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than « » (« ») days from the date of commencement, or as follows:
(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

«Substantial Completion shall be achieved no later »

Portion of Work	Substantial Completion Date

, subject to adjustments of this Contract Time as provided in the Contract Documents.
(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

« »

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be « » ($ «»), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

«N/A »

§ 4.3 Unit prices, if any:
(Identify and state the unit price; state quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price Per Unit ($0.00)

§ 4.4 Allowances included in the Contract Sum, if any:
(Identify allowance and state exclusions, if any, from the allowance price.)

Item	Price

ARTICLE 5 PAYMENTS

§ 5.1 PROGRESS PAYMENTS

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

.1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of « » percent (« » %). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;

.2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of « » percent (« » %);

.3 Subtract the aggregate of previous payments made by the Owner; and

.4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

.1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and
(Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)

.2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:
(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

« »

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 FINAL PAYMENT

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

« »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »
« »

§ 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:
(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)

[« »] Arbitration pursuant to Section 15.4 of AIA Document A201–2007

[« »] Litigation in a court of competent jurisdiction

[« »] Other *(Specify)*

« »

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

« » % « »

§ 8.3 The Owner's representative:
(Name, address and other information)

«Joy Hottovy Willoughby, PE »
«Senior Project Manager »
«Engineering/Transportation/Planning »
«Metro Transit »
«2222 Cuming Street »
«Omaha, Nebraska 68102 »

§ 8.4 The Contractor's representative:
(Name, address and other information)

«»
« »
« »

§ 8.5 Neither the Owner's nor the Contractor's representative shall be changed without ten days written notice to the other party.

§ 8.6 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

§ 9.1.4 The Specifications:
(Either list the Specifications here or refer to an exhibit attached to this Agreement.)
«See attached Project Manual dated August 2017 »

Section	Title	Date	Pages

§ 9.1.5 The Drawings:
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)
«See attached Final Plans »

Number	Title	Date

§ 9.1.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9.

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

.1 AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:

« »

.2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

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ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.

(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

Type of insurance or bond	Limit of liability or bond amount ($0.00)
Performance Bond	100% of the Contract Sum
Labor & Materials Payment Bond	100% of the Contract Sum
Maintenance Bond	100% of the Contract Sum

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
« »« »	« »« »
(Printed name and title)	*(Printed name and title)*

DIVISION 6 –
General Conditions

AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
Omaha Rapid Bus Transit Station Canopy Package
NE-79X-001
Omaha, NE

THE OWNER:
(Name and address)
Transit Authority of the City of Omaha
d/b/a Metro
2222 Cuming Street
Omaha, NE 68102
402-341-7560

(Hereinafter referred to as "METRO" or "Owner")

THE ARCHITECT:
(Name and address)
AECOM
564 White Pond Drive
Akron, Ohio 44320
330-836-9111

THE CONTRACTOR
(Name and address)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. No *Additions and Deletions Report* noting added information or revisions to the standard form text is attached to this document. In some, but not necessarily in all cases, a vertical line in the left margin of this document and/or underscoring indicates where the author has added necessary information or deleted or revised the original AIA text. Neither Metro nor any member of its Board of Directors, officers, employees, agents, professional and other consultants or representatives are responsible to Contractor for the failure to so denote any such matters. It is the Contractor's sole responsibility to review this document as may be revised in its entirety. This document has important legal consequences. Consultation with an attorney is encouraged with respect to its execution, review, completion or modification. Notwithstanding the fact that this document or any other Contract Document may have been prepared by counsel for one of the parties, by its execution of the Agreement and by otherwise entering into the Contract, each party (as defined in this document) confirms that it and its respective counsel have reviewed, negotiated and adopted the Agreement, the Contract and all Contract Documents as the joint agreement and understanding of the parties, and this Agreement is to be construed as a whole and any presumption that ambiguities are to be resolved against the primary drafting party shall not apply.

TABLE OF ARTICLES

INDEX

(Numbers and Topics in Bold are Section Headings)

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 The Contract Documents The Contract Documents consist of (a) the Agreement, including all exhibits and schedules attached to the Agreement, (b) all Conditions of the Contract (including these General Conditions, all Supplementary Conditions), and other Conditions), (c) the Drawings, the Specifications, all Addenda and all other RFP Documents),, (d) the Proposal, (e) the performance bond, the labor and material payment bond and all other bonds required by the RFP or these General Conditions, (f) any documents, information or other items or matters designated as a Contract Document in the Agreement; (g) all agreed to Change Orders (as defined in the Agreement), each of which is or will be integrated into and made a part of the Agreement, and (h) any other Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind between (i) Contractor and Architect or Architect's consultants, (ii) between Metro and a Subcontractor, (iii) between Metro and the Architect or the Architect's consultants or (iv) between any persons or entities other than Metro and Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.2 The Contract The Contract Documents form the contract ("Contract") between Metro and Contractor concerning the Work and the Project. The Contract constitutes the entire integrated agreement (and supersedes all prior negotiations, representations, agreements and understandings, both written and oral) between Metro and Contractor as to the subject matter of the Contract. The Contract may be amended or modified only by a Modification. The Contract shall not be deemed to exist unless the Contract has been awarded to the Contractor by the Metro Board of Directors at a public meeting. Notwithstanding any such award of the Contract to Contractor, the Contract shall not be deemed to be binding upon Metro or to otherwise have any force or effect unless the Agreement has been duly executed by both Metro and Contractor, and all conditions that are applicable to the award of the Contract and that otherwise may be required by the Contract Documents have been fully satisfied. The Contract is sometimes used interchangeably in these General Conditions with "Agreement" and, if so, the Agreement and the Contract shall be ascribed that meaning.

§ 1.1.3 The Work "Work" means and refers to all supervision, direction, employees and other labor, all materials, supplies, services, work, machinery, transportation, tools, equipment, plant required for set-up of general plant, storage/staging areas and facilities, and all other tasks and incidentals necessary to fabricate, construct, assemble, install and otherwise perform and complete the Project, the Work and the Contract as and when required and otherwise in conformity with the Contract Documents.

§ 1.1.4 The Project The Project is the total construction of Omaha Rapid Bus Transit Station Canopy Package, NE-79X-001, Omaha, NE of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 The Drawings The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 The Specifications The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments Of Service Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by Contractor shall be required only to the extent consistent

with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§1.2.2 Organization of the Specifications into divisions, Sections and Articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.2.4 Reference to standard specifications of any technical society, organization, or association, or to codes of local or state authorities, shall mean the latest standard, code, specification, or tentative specification adopted and published thirty days prior to taking Bids, unless specifically stated otherwise.

§ 1.2.5 The Contractor shall notify the Architect in writing of any inconsistency found between the Specifications and Drawings. The Architect will then advise the Contractor whether the Specifications will control.

§ 1.2.6 The terms "this Contractor," "furnished under other Sections." "included as part of other Sections," "related work in other Sections," or similar description of segregation shall not be interpreted to limit the responsibility of any particular party involved in the Work. The limitations of any Subcontractor's Work shall rest solely upon the agreement between the Contractor and the subcontractor, regardless of where the Work is called for in the Contract Documents.

§ 1.2.7 Omissions in the Contract Documents of such words and phrases as "the Contractor shall," "shall consist of," "as indicated on the Drawings," "in accordance with," "shall," "and," "the," etc., are intentional. Such words and phrases shall be supplied by inference.

§ 1.2.8 The term "product" shall be understood to mean materials, systems, and equipment.

§ 1.2.9 The term "provide" shall be understood to mean "provide complete in place;" that is, "furnish and install."

§ 1.2.10 Whenever the words "necessary," "proper," or words of like effect are used in the Contract Documents with respect to the extent, conduct, or character of work specified, they shall mean that the said work shall be carried to the extent, must be conducted in a manner, or be of a character which is "necessary" or "proper" under the circumstances in the opinion of the Architect, and the Architect's judgment in such matters shall be considered final.

§ 1.2.11 Whenever the words "as required," "as directed," "as permitted," and words of like effect are used in the Contract Documents, it is understood that the requirements, direction, or permission of the Architect are intended, unless otherwise stated; similarly, the words "approved," "acceptable," "satisfactory," or words of like import shall mean "approved by," "acceptable to," or "satisfactory to" the Architect, unless otherwise stated.

§ 1.2.12 should discrepancies appear among Contract Documents, Contractor shall request interpretation in writing before proceeding with the Work. If Contractor fails to make such request, no excuse will thereafter be entertained for failure to carry out Work in satisfactory manner. Should conflict occur in or between Drawings and Specifications, Contractor is deemed to have included the more expensive way of doing work in Contractor's Bid unless Contractor shall have asked for and obtained written decision before submission of Contractor's Bid Proposal as to which method or materials will be required.

§ 1.2.13 Where the words "METRO" or "Owners" or "the Authority" is used in any Contract Document reference is made to The Transit Authority of the City of Omaha, a body politic and corporate and a governmental subdivision of the State of Nebraska.

§ 1.2.14 Where the words "Project Manual" or "RFP Document" or "Contract Document" are used in the Project Manual or any other Contract Document, synonymous reference is made to the same instrument including any associated Drawings or Addenda and any other associated Contract Document.

§ 1.2.15 Where the words "Architect" or "Engineer" are used in any Contract Documents the words are interchangeable meaning a State of Nebraska registered professional licensed to design unrestricted public and private facilities. In addition, "Architect" or "Engineer" may also mean the Representative to the extent applicable

for the Project.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity, the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.4.1 ADDITIONAL DEFINITIONS

In addition to any other term that may be defined in these General Conditions or in any other Contract Document, whenever used in these General Conditions or any other Contract document, the following words shall be ascribed the following meanings: (a) "**Agreement**" means and refers to the AIA Contract A-101 Standard Form of Agreement (as modified by Metro) between Owner and Contractor, 2007 Edition in the form duly executed by Metro and Contractor; (b) "**business day**" means Monday through Friday of a calendar week other than a day that is recognized by Metro as a holiday for Metro's administrative personnel; (c) "**Contractor**" means individual responsible for the complete construction of the Scope of Work as defined in the Contract Documents; provided, however, that when the context shall require, (i) the term Contractor shall mean and refer to Contractor's authorized representative that designated by Contractor from time to time as required by the Contract Documents, and (ii) the Subcontractor as and when contemplated by any Contract Document; (d) "**Environmental Regulation**" means and refers to any Law pertaining to pollution or the regulation or protection of public health and safety, occupational health and safety, industrial hygiene, natural resources or the environment, or relating to releases or threatened releases, discharges, emissions, or disposals to air, water, soil, or groundwater, or relating to the manufacture, processing, distribution, use, generation, labelling, testing, treatment, transportation, disposal, storage, remediation, or handling or management of solid waste, hazardous waste, hazardous materials or hazardous substances, including the Comprehensive Environmental Response, Compensation and Liability Act (42 U.S.C. §9601, et seq.), the Hazardous Materials Transportation Act (49 USC Section 1801 et seq.), the Resource Conservation and Recovery Act (42 U.S.C. §6901 et seq.), the Toxic Substance Acts Control Act (15 USC Sections 2601 et seq.), the Clean Air Act (42 USC Sections 7401 et seq.), and the Clean Water Act (33 USC Sections 1251 et seq.), and any other Laws relating to or pertaining to the environment; (e) "**Governmental Authority**" means and refers to any governing bodies (including any governmental (and quasi-governmental), federal, state and local subdivision or unit of such governing body, together with their respective officials, authorities, agencies, departments and divisions) that has jurisdiction, whether in whole or in part, over any matter that, at any time, may relate to or pertain to any matter to which any Governmental Requirement may govern or apply. Governmental Authority includes the United States Department of Transportation ("**DOT**") and the Federal Transit Administration ("**FTA**"); (f) "**Governmental Requirement**" means any requirement of any Governmental Authority that is, or that may become, effective or applicable at any time to any of the Contract Documents, the Project, the Work or Contractor's performance under and in respect of the Contract, including all Laws and Regulatory Approvals of any Governmental Authority and all regulations, rules, orders, directives and standards and other requirements all regulations, rules, orders, directives and standards and other requirements issued or promulgated thereunder that Metro may be at any time be required to implement, observe, execute, follow or adhere to, whether by application of the provisions of any applicable Master Agreement between Metro and the FTA ("**Master Agreement**"), any Laws or Regulatory Approvals or otherwise; (g) "Grant Administrator means the individual responsible for managing agency grants or such other individual designated by Metro in such capacity; (h) "**include**", "**included**", "**including**" and words of similar import shall be construed as if followed by the phrase "without limitation"; (i) "**Law(s)**" means all statutes, laws, codes, ordinances, regulations, rules, orders, directives and standards of any Governmental Authority, that may be in effect or that may be or that may become applicable at any time to the any of the any of the Bid Documents, the Contract Documents, the Project, the Work, the Contract or Contractor's performance under and in respect of the Contract. Laws includes all Environmental Regulations and the Federal Transportation Act and all regulations, rules, orders, directives and standards and other requirements issued or promulgated thereunder; (j) **Modification** means (i) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect; (k) "**Party**" means Metro or Contractor, individually and "**Parties"** means Metro and Contractor, collectively; (l) "**Person"** shall mean an individual, partnership, corporation, limited liability company, trust or unincorporated organization, and a Governmental Authority; (m) "**Proposal**" means and refers to the response and offer of the Contractor submitted on the prescribed forms and in the prescribed manner setting forth, among other matters, the prices for the Work to be

performed. The Proposal includes all required and completed forms, together with all other attachments, documents, instruments, forms, submissions, exhibits and schedules attached thereto or referenced therein or that were otherwise submitted or furnished (or is required to be submitted or furnished) to Metro at any time by Contractor as part of the Proposal in accordance with the RFP, and includes the Proposal Security; (n)"**Regulatory Approval**" means any and all approvals, licenses, permits, consents, registrations or authorizations, certificates, forms and licenses of any Governmental Authority that may be in effect or that may be or that may become applicable at any time to the Bid Documents, the Contract Documents, the Work, the Project or Contractor's performance under or in respect of the Contract; (o) "**Representative**" means and refers to AECOM and such other individual designated by Metro to Contractor from time to time; provided however, that any limitations or restrictions imposed on the Architect by this Agreement shall not be construed to limit or restrict AECOM in its capacity as Representative; (p) "**RFP**" means the Request for Proposals in respect of the Project issued by Metro and dated as of July 27,2018; and (q) **RFP Documents**" means and refers to all documents issued by Metro in furtherance of the RFP. The RFP Documents include: (i) Metro's Notice of the Request for Proposals (including any other advertisement or invitation to bid and any related published information), (ii) the Project Manual together with all attachments, documents, instruments, forms (including all sample forms, other information furnished by Metro in anticipation of receiving proposals), submissions, exhibits and schedules attached thereto or referenced therein, (iii) all Addenda, (iv) all inquiries, notices, requests, forms, requests, documentation and other matters that a prospective Proposer is required or permitted to submit in furtherance of any communication with Metro pursuant to the RFP.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Drawings, Specifications and other Contract Documents, including those in electronic form, prepared by the Architect and the Architect's consultants are Instruments of Service through which the Work is to be executed by the Contractor is described. The Contractor may retain one record set. Neither the Contractor nor any Subcontractor (including any material or equipment supplier) shall own or claim a copyright in the Drawings, Specifications and other documents prepared by the Architect or the Architect's Consultants, and unless otherwise indicated the Architect and the Architect's consultants shall be deemed the authors of them and Metro shall be deemed the owner and will retain all common law, statutory and other reserved rights, in addition to the copyrights. All copies of instruments of Service, except the Contractor's record set, shall be returned or suitably accounted for to the Metro on request, upon completion of the Work.

The Drawings, Specifications and other documents prepared by the Architect and the Architect's consultants, and copies thereof furnished to the Contractor, are for use solely with respect to this Project. They are not to be used by the Contractor or any Subcontractor (including any material or equipment supplier) on other projects or for additions to this Project outside the scope of Work without the specific written consent of the Metro the Architect and the Architect's consultants. Contractor, Subcontractors and material or equipment suppliers are authorized to use and reproduce applicable portions of the Drawings, Specifications and other documents appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this authorization shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Metro's copyrights or other reserved rights.

§ 1.5.2 The Contractor, Subcontractors (including any material or equipment supplier) may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Metro, Architect and the Architect's consultants, which consent may be withheld in Metro's sole judgment and absolute discretion.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 Whenever used in any Contract Document, the term "Owner" shall mean and refer to Metro. The Owner is referred to throughout the Contract Documents as if singular in number. The Representative shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Metro may designate (and replace) a substitute Representative in writing from time to time.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, Metro shall secure and pay for any necessary approvals, easements, assessments and charges required for the use or occupancy of permanent structures on any Project site or for permanent changes in existing facilities (which shall not be deemed to include any location or plant required for set-up of general plant, storage/staging areas and facilities).

§ 2.2.3 If in the possession of Metro as of the date of the award of the Contract, Metro will furnish upon request from Contractor any existing surveys or plans describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. Contractor shall be entitled to rely on the accuracy of information so furnished by Metro but shall exercise proper precautions relating to the safe performance of the Work. If the Work is on private property, Contractor shall be responsible for identifying and locating underground utilities.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge up to five (5) copies of Drawings and Project Manuals. Additional sets will be furnished at the cost of reproduction, postage, and handling.

§ 2.2.6 In the case of revision, Modification, or supplemental information issued during construction, the Architect shall furnish the General Contractor five (5) copies of each Supplementary Drawing or drawing changed.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

Without limitation to any additional or other similar right, remedy or recourse of Metro by application of the provisions of these General Conditions or any other Contract Document or as otherwise may be permitted in law or equity, if Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents or fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten (10) calendar day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such event (without limitation to any additional or other similar right or remedy of Metro under any Contract Document or as otherwise provided in law or equity), an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate to Metro in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract.

§ 3.1.2 The Contractor shall perform the Work in accordance with, and in conformity to, the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work required by the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited all Project sites, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, if any, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a qualified contractor familiar with the requirements of the Work and the related sites as required by Section 3.2.1, and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, then, (without limitation to any additional or other similar right or remedy of Metro under any Contract Document or as otherwise provided in law or equity), Contractor shall be obligated to pay all costs and damages to Metro as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to Metro or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable Governmental Requirement.

§ 3.2.5 The Contractor shall do no Work without Drawings, Specifications or written instructions or interpretations from the Architect or the Representative.

§ 3.2.6 The Contractor's notices or reports to the Architect of errors, inconsistencies, or omissions shall be submitted in writing.

§ 3.2.7 Contractor questions regarding errors, format, inconsistencies, omissions, or interpretations of the Contract Documents shall be submitted in writing to the Architect and in a consistent format, referred to as a "Request For Information," numbered sequentially according to submission and dated.

§ 3.2.8 The Architect shall respond to written notices, reports, or Requests for Information in a timely fashion. The Contractor hereby acknowledges that (1) a timely response may require consultation and coordination with preparation of supplementary information or drawings and (2) no extension of Contract Time will be authorized because of failure to notify Architect sufficiently in advance of the Work to permit his timely review and response.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 Without limitation to this or any other performance obligation under or in respect of the Contract, Contractor shall perform, supervise and direct the Work, using Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, sequence and other techniques and

procedures and for coordinating all portions of the Work under the Contract Documents unless Contractor is given other specific written instructions concerning these matters from the Architect or the Representative. If the Contract Documents gives specific instructions concerning construction means, methods, techniques, sequences or procedures, Contractor shall evaluate the jobsite safety thereof and, except as stated in this Section 3.3.1, Contractor shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to Metro and to Architect and shall not proceed with that portion of the Work without further written instructions from the Architect.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts, errors and omissions (including all performance of, any failure to perform or to properly perform the Work as required by the Contract Documents) of Contractor and each Subcontractor's (including any material or equipment supplier), including its and their respective contractors, agents and employees all other persons or entities performing portions of the Work for, or on behalf of, the Contractor and any Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.3.4 Contractor Responsible for All Work/Performance. Whether or not provided by Contractor, any Subcontractor or any other person or entity, Contractor shall be responsible for all performance undertaken or required under or in respect of the Contract (including all performance of, any failure to perform or to properly perform the Work as required by the Contract Documents) and providing all services, equipment, facilities, and functions which are necessary for the safe, reliable, efficient, and well-managed operation of the Project, the Work and the Contract consistent with established industry practices, whether or not those services, equipment, facilities, and functions are specifically required by the terms of the Contract Documents.

§ 3.3.5 Minimum Contractor Participation. Notwithstanding any permitted use by Contractor of any Subcontractors, Contractor shall have a minimum participation level of not less than thirty percent (30 %) of the Contract Sum.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise expressly provided in the Contract Documents to be the additional expense and cost of Metro, Contractor shall procure, provide and pay for all Work, supervision, direction, employees and other labor, all materials, supplies, services, machinery, transportation, tools, equipment, plant required for set-up of general plant, storage/staging areas and facilities, and all other tasks and incidentals necessary to fabricate, construct, assemble, install and otherwise perform and complete the Project, the Work and the Contract as and when required and otherwise in conformity with the Contract Documents, including all applicable Regulatory Approvals and other Governmental Requirements and all water, heat, utilities, and other facilities and services, in all cases necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees, Subcontractors and other persons carrying out the Work. The Contractor shall not employ or permit any Subcontractor to employ any unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.4.4 Intentionally Deleted

§ 3.4.5 Contractor shall submit all requests for substitution of products for the Work in writing in accordance with the procedures identified in the RFP Documents.

§ 3.4.6 By making permitted requests for substitutions, the Contractor shall certify that the cost data presented is complete and includes all related costs under the Contract including the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent.

§ 3.4.7 Notwithstanding existing OSHA or state law, or other Governmental Requirement, if in the reasonable opinion

of the Architect or Metro, an employee of Contractor, a Subcontractor or supplier is acting in an unsafe manner, or in a manner prohibited by the Contract or any Governmental Requirement, the Architect or Metro can request that the contractor remove that employee immediately. After appropriate disciplinary action except to the extent prohibited by any Governmental Requirement, Contractor may allow that employee to return to the Project, no sooner than 48 hours following removal, and subject to approval by the Architect and Metro.

§ 3.4.8 All Work, whether or not so specified in the Contract Documents, shall conform to and comply with and be performed in compliance with all Governmental Requirements and all Contract Documents; however, where a higher quality of materials or type of construction is shown or specified than is required by any Governmental Requirement, the higher quality material, or type of construction, in addition to compliance with the Governmental Requirement, shall be furnished.

§ 3.5 WARRANTY

All Work shall be performed in a good and workman like manner using highest industry standards and in accordance with good construction practices and pursuant to, subject to, and in conformity with the Contract Documents. Contractor warrants that (a) all materials, supplies and equipment furnished in respect of Work will be new and of good quality unless otherwise expressly permitted by the Contract Documents, (b) all Work will be free from defects not inherent in the quality required or permitted by the Contract Documents and will otherwise conform to the Contract Documents, as evidenced by Contractor to the satisfaction of Metro whenever requested by Metro, and (c) unless solely caused by abuse, alterations to the Work not executed by Contractor or any Subcontractor, supplier or other person for whom Contractor is responsible, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage, Contractor shall repair, replace, correct or otherwise remediate any deficient, defective or non-conforming Work for a period of two years, See Article 12 from Metro's final acceptance of all Work, or such longer period as may be applicable by application of provision of any of the other Contract Documents. All corrected Work shall carry an additional one-year warranty period, beginning on the date on which the Metro accepts the corrected Work. During the warranty period, Contractor shall repair, replace, correct or otherwise remediate any deficient, defective or non-conforming Work at its own expense.

§ 3.5.1 Contractor shall assume responsibility and warrant for workmanship and materials whether the same are made by the Contractor or Subcontractor or purchased from an outside source.

§ 3.5.2 Contractor shall bear all risk of loss or damage to the Work, and each part and portion thereof, wherever the same may be located until the date that all Work has been finally accepted by Metro. Nothing in this Section 3.5.2 shall be construed to relieve Contractor from any covenant, warranty or representation that continues after such acceptance or any policy of insurance that would otherwise be applicable.

§ 3.5.3 If Contractor fails to replace, correct or repair Work that does not conform to any provision of the warranty set forth in Section 3.5 at any during the warranty period; then without limitation to any additional or other similar right or remedy of Metro under any Contract Document or as otherwise provided in law or equity, Metro may replace, correct and repair subject work at Metro's expense, subject to Metro's right to have and recover any right remedy or recourse in respect of Contractor's failure to so perform, and Contractor shall pay all costs related to repair correct or replace the work, a reasonable administrative fees plus to the fullest extent permitted by Law, all costs and expenses incurred by Metro to recover such amounts, including reasonable attorney's fees.

§ 3.5.4 Contractor shall be required to shall provide a two (2) year maintenance bond which becomes effective from the date of Substantial Completion of all Work.

§ 3.5.5 Contractor shall assign to the Owner (at the time of final acceptance of all Work) any and all manufacturer's warranties relating to the Work and further agrees to preserve all such manufacturer's warranties, including those required by any Contract Documents.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when Proposals are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.6.1 Metro is exempt from payment of federal excise and transportation tax and any sales and use taxes otherwise applicable under the Laws. Metro will provide Contractor with any Tax Exemption Certificate or other appropriate documentation upon request.

§ 3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

§ 3.7.1 Contractor shall secure and pay for all costs and related expenses associated with any Governmental Requirements, including any Regulatory Approval and/or permits, that may be required or appropriate for proper execution and completion of the Work in conformity with the Contract Documents.

§ 3.7.2 The Contractor shall comply with and give notices required by any Governmental Requirement.

§ 3.7.3 If Contractor or any Subcontractor performs any Work that is contrary to any Governmental Requirement, Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions. If Contractor encounters conditions at any Project site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist or that are generally recognized as inherent in construction activities of the character provided for in the Contract Documents, Contractor shall promptly provide notice to Metro and the Architect before conditions are disturbed and in no event later than required in order to meet the Contract Time or any other schedule or milestone provided in any Contract Document. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify Metro and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands at any Project site not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify Metro and Architect. Upon receipt of such notice, Metro Owner shall promptly take any action necessary to obtain any Regulatory Approval required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other Work and operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 INTENTIONALLY DELETED

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work. The Contractor shall monitor the progress of the Work for the Project and shall promptly advise the Owner of any delays or potential delays.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.10.4 In the event that the Owner determines that the performance of the Work has not progressed or reached the level of completion required by the Contract Documents, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction. The Contractor shall not be entitled to an adjustment in the Contract Sum in connection with the performance of such corrective measures for delays caused by the errors or omissions of the Contractor, subcontractors or materialmen.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop

Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures or other obligations or responsibilities under or in respect of the Contract. The Contractor shall not be required to provide professional services in violation of applicable Law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Except to the extent otherwise set forth in the Contract Documents, Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by the applicable Governmental Requirements and the Contract Documents and shall not unreasonably encumber the site with materials or equipment. Further, the Contractor shall use best efforts to minimize any interference with the occupancy or use of any areas or buildings adjacent to or near to the site of the Work, but shall in all instances conduct all operations in compliance with all Governmental Requirements.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep all Project sites, staging areas and other premises and surrounding areas free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about all such areas.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor or to set-off costs reasonably incurred by Metro for such purposes against any amounts, including retainage, owed to Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.17.1 Ownership, Identification, And Confidentiality Of Work

a. All reports, programs, documentation, designs, drawings, plans, specifications, schedules and other materials prepared, or in the process of being prepared, for the services to be performed by Contractor shall be and are the property of Metro and shall be identified in an appropriate manner by a title containing Metro's name and address.

b. Metro shall be entitled access to and copies of these materials during the progress of the Work.

c. Any such material remaining in the possession or under the control of the Contractor or in the possession or under the control of a Subcontractor upon completion or termination of the Work shall be immediately delivered to Metro. If any materials are lost, damaged or destroyed before final delivery to Metro, the Contractor shall replace them at its own expense, and the Contractor assumes all risks of loss, damage or destruction of or to such materials.

d. The Contractor may retain a copy of all materials produced by Contractor under the Contract for its own internal use.

e. Any Metro materials to which the Contractor has access or materials prepared by the Contractor shall be held in confidence by the Contractor, who shall exercise all reasonable precautions to prevent the disclosure of confidential information to anyone except the officers, employees and agents of the Contractor as may be necessary to effect the Work and otherwise comply with the Contract documents.

f. Access to or copies of any reports, information, data, etc., available to or prepared or assembled by the Contractor under the Contract shall not be made available to any third party by the Contractor without the prior written consent of Metro, which consent may be withheld by Metro in its sole judgment and absolute discretion.

g. Each tangible product resulting from Work performed under or in respect of the Contract shall be labeled with information stating that the project has been financed with federal assistance provided by the U.S. Department of Transportation, Federal Transit Administration.

§ 3.17.2 Patents And Rights In Data And Copyrights

§ 3.17.2.1 Rights in Data

a. The term "subject data" used in this clause means recorded information, whether or not copyrighted, that is delivered or specified to be delivered under the Contract. The term includes graphic or pictorial delineation in media such as drawings or photographs; test in specifications or related performance or design-type documents; machine forms such as punched cards, magnetic tape, or computer memory printouts, and information retained in computer memory. The term "subject data" does not include financial reports, cost analyses, and similar information incidental to contract administration.

b. The following restrictions apply to all subject data first produced in the performance of this Contract:

a. Except for its own internal use, Contractor may not publish or reproduce subject data in whole or in part or in any manner or form, nor may Contractor authorize others to do so, without the written consent of Metro except to the extent Metro may have previously may have either released or approved (in writing) the release of such data to the public.

b. In accordance with 49 C.F.R. § 18.34 and 49 C.F.R. § 19.36, the federal government reserves a royalty-free, non-exclusive and irrevocable license to reproduce, publish, or otherwise use, and to authorize others to use, for "federal government purposes."

(1) Any subject data developed under the Contract, whether or not Contractor or Metro registered the copyright has been obtained; and

(2) Any rights or copyright purchased by Metro or the Contractor using federal assistance in whole or in part provided by FTA.

As used in the previous sentence, "for federal government purposes," means use only for the direct purposes of the federal government.

c When FTA awards federal assistance for experimental, developmental, or research work, it is FTA's general intention to increase transportation knowledge available to the public, rather than to restrict the benefits resulting from the work to participants in that work. Therefore, unless FTA expressly determines otherwise, Contractor by performing experimental, developmental, or research work required by the underlying Contract agrees to permit FTA to make available to the public, either under FTA's license in the copyright to any subject data developed in the course of this Contract, or through distribution of a copy of the subject data first produced under this Contract for which a copyright is not available under 17 U.S.C. § 101 et seq. If the experimental, developmental or research work, which is the subject of the underlying Contract, is not completed for any reason whatsoever, all data developed under this Contract shall become subject data as defined previously and shall be delivered as the federal government may direct. This provision, however, does not apply to adaptations of automatic data processing equipment or programs for Metro or Contractor's use whose costs are financed in whole or in part with federal assistance provided by FTA for transportation capital projects.

d. Except to the extent prohibited by Law, Contractor agrees to indemnify, save, and hold harmless Metro, DOT, the FTA and the federal government, and its and their respective directors, officers, agents, Board members, attorneys, professional and other consultants and representatives, and employees acting within the scope of their official duties (collectively with Metro, the "**Metro Indemnified Party/ies**") against any liability, including costs and expenses, resulting from any claim against any Metro Indemnified Party alleging misappropriation or infringement of intellectual property or proprietary rights, copyrights, or rights of privacy of a third party, arising out of the publication, translation, reproduction, delivery, use or disposition of any data or Work furnished under this Contract. Contractor shall not be required to indemnify any Metro Indemnified Party under this Section to the extent such liability may arise directly and solely from the wrongful act of such Metro Indemnified Party.

e. Nothing contained in this Section of rights in subject data shall imply a license to the federal government under any Contractor patent of be construed as affecting the scope of any license or other right granted to the federal government under any Contractor patent.

f. Data that is developed by the Metro or Contractor under the Contract and financed entirely without using federal assistance provided by the federal government that has been incorporated into work required by the Contract is exempt from the requirements of Subsections (b), (c), and (d) of this Part (2) of this Section, provided that Metro or Contractor identifies that data in writing at the time of delivery of the Work.

Patent Rights. If any invention, improvement, or discovery of the Contractor is conceived or first actually

reduced to practice in the course of Work under this Contract, and that intervention, improvement, or discovery is patentable under the laws of the United States of America or any foreign country, the Contractor agrees to notify Metro immediately and provide a detailed report, who in turn shall ultimately notify the FTA. Unless the federal government later makes a contrary determination in writing, and irrespective of the Contractor's status (a large business, small business, state government or state instrumentality, local government, nonprofit organizations, institution of higher education, individual), Metro and Contractor agree to take the necessary actions to provide, through FTA, those rights in that invention due the federal government as described in U.S. Department of Commerce regulations, "Rights to Inventions Made but Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," 37 C.F.R. Part 401.

§ 3.18 INDEMNIFICATION

§ 3.18.1 Without limitation to or prejudice to any other indemnity or other payment obligation or liability of Contractor to any Metro or any other Metro Indemnified Party whether by application of any provision of any Contract Document or otherwise, Contractor agrees to and shall indemnify and hold harmless each Metro Indemnified Party from and against any all claims, losses, damages, deficiencies, costs, penalties, fines, interest, monetary sanctions causes of action, suits, liens and liabilities of every kind, and under any theory of Law (including by application of any Governmental Requirement) whatsoever, for bodily injury (including death), sickness, disease, or and for damages to any property, (collectively "**Losses**") to the extent such Losses may arise or result from, out of, or in connection with the intentional or negligent acts, errors or omissions of Contractor or any Subcontractor, (including in the case of both Contractor and any Subcontractor, its or their respective officers, employees, contractors or subcontractors, or other agents or representatives) in performing under or in respect of the Contract. Losses include all any statutory, consequential, special, incidental or similar damages together with all amounts paid by any Metro Indemnified Party in settlement of any Loss, and all related expenses reasonably incurred by a Metro Indemnified Party in respect of litigation, court costs, expert witness fees, and reasonable attorneys' fees whether or not suit be commenced) and all costs incurred by any Metro Indemnified Party to comply with injunctions and other court and agency orders, and all other costs and expenses incident to any suit, action, investigation, claim or proceeding or to establish or enforce the Metro Indemnified Party's right to indemnification under this under this Section 3.18. If any action or proceeding (whether at law or in equity) is brought by any third party against Contractor arising out of or resulting from the acts of Contractor in performing Work under or in respect of the Contract, Contractor shall promptly notify Metro.

§ 3.18.2 If any action or proceeding (whether at law or in equity) is brought by any third party against Metro Indemnified Party arising out of or resulting from the acts of Contractor in performing Work under or in respect of the Contract, and if Contractor has failed to provide insurance coverage to Metro against such action as required by the Contract Documents, The Metro Indemnified Party shall have the right to conduct and control, through counsel of its choosing, the defense of any such third party claim, action or suit, and may compromise or settle the same, provided that the Metro Indemnified Party shall give the Contractor advance notice of any proposed compromise or settlement. Contractor will be bound to indemnify the Metro Indemnified Party for the proposed settlement amount unless within 15 days of such notice, Contractor objects in writing. If the parties are unable to resolve Contractor's objections, the Metro Indemnified Party will not be precluded from settling any claim, but Contractor will not be precluded from challenging its liability and the amount of the settlement payment. Metro Indemnified Party shall permit Contractor to participate in the defense of any action or suit brought against Metro Indemnified Party for which Contractor may be liable by application of Section 3.18.1 through counsel chosen by the Contractor, provided that the fees and expenses of such counsel shall be borne solely by Contractor. If Metro Indemnified Party permits Contractor to undertake, conduct and control the conduct and settlement of such action or suit, Contractor shall not consent to any settlement that does not include as an unconditional term thereof the giving of a complete release from liability with respect to such action or suit to Metro. Contractor shall promptly reimburse Metro Indemnified Party for the full amount of any damages, including fees and expenses of counsel for Metro Indemnified Party, incurred in connection with any such action.

§ 3.18.3 In claims against any Metro Indemnified Party by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable or responsible, Contractor's indemnification obligation under Section 3.18.1 shall not be limited by any limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under the Nebraska Worker's Compensation Act or any other similar, disability benefit acts or other employee benefit acts.

§ 3.18.4 Nothing in Section 3.18 shall be construed to limit or preclude any right, remedy or recourse of Metro whether at Law or in equity to have and recover from Contract any damages of any nature whatsoever under any theory of recovery whatsoever (including statute, tort, warranty, contract, subrogation, contribution or

indemnification) that may arise or result from, out of, or in connection with Contractor's breach of any warranty (whether expressed or implied), any breach or default of, or under the Contract, including any failure to comply with, to perform, or properly perform, any covenant, obligation or responsibility under or in respect of the Contract or the failure of any representation of Contractor to be true, accurate and complete in any material respect at any time.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect or engineer lawfully licensed to practice architecture or engineering or an entity lawfully practicing architecture or engineering in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect or engineer as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate For Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of Work, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications Facilitating Contract Administration Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12 or any other requirement of the Contract Documents. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may only authorize minor changes in the Work as provided in Section 7.4 once approval from Metro is granted. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents and with approval from Owner.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor. Notwithstanding anything contained in any Contract Document to the contrary, Contractor shall not use any subcontractor to perform any Work or otherwise in respect of the Project other than those Subcontractors identified by Contractor in its Proposal (to be included in the Appendix to the Agreement) or that are otherwise approved by Metro in accordance with the Contract Documents. For avoidance of any doubt, "Subcontractors" shall include all of Contractor's or a Subcontractor's major suppliers, major materialmen or other persons or entities providing similar services (including

those who are to furnish materials or equipment special to fabrication. The term Subcontractor also shall mean and refer to any Sub-subcontractor or subcontractor at any tier. Contractor hereby represents that all Subcontractors included with its Proposal have consented and agreed to perform the Subcontract Work identified with each Subcontractor and have authorized this representation to be made.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 INTENTIONALLY DELETED

§ 5.2.2 Other than those Subcontractors identified by Contractor in its Proposal, no Work shall be subcontracted without the prior written approval of Metro. The only Subcontractors approved for this Contract, if any, are identified by Contractor in its Proposal and those that listed on an Appendix to this Contract. Any substitutions or additions of Subcontractors must have the prior written approval of Metro which may be withheld in its sole judgment and absolute discretion. Contractor shall be solely responsible for all payments, other compensation and reimbursement to be paid each Subcontractor and all service firms retained by Contractor or any Subcontractor in respect of the Work or Project, and Owner shall have no obligation to them. If Contractor fails to pay, compensate or otherwise reimburse any Subcontractors or service firms after receiving payment from Metro pursuant to a progress or other payment that includes Subcontractors' or service firms' work, Metro reserves the right to directly pay, compensate or reimburse the Subcontractor or service firm and withhold such payments directly from any future payments required to be paid to Contractor, and any retainage then or later held by Metro in respect of the Contract, or draw down on any letter of credit provided in lieu of retainage under the Contract. Metro may require lien waivers from all Subcontractors or service firms before any progress or other payment or reimbursement is made to the Contractor. Without limitation to Article 9, including Section 9.3.7, a breakdown of all payments to all Subcontractors and service firms shall be included with each Contractor's invoice or Application for Payment submitted to Metro on the form titled, "Subcontractor Monthly Utilization Report." An invoice or Application for Payment made by Contractor for any Subcontractor Work shall constitute Contractor's certification that all such Work has been completed in accordance with the Contract Documents.

§ 5.2.2.1 Prompt Payment. The Contractor is required to pay all Subcontractors (whether or not a DBE Subcontractor) performing Work related to the Contract for satisfactory performance of Work in accordance with the timing specified in any Governmental Requirement or no later than 30 days, whichever is less, after Contractor's receipt of payment for that Work from Metro. Any delay or postponement of payment from the above referenced time frame is permitted only if Contractor has made a showing of good cause satisfactory to Metro. A breakdown of all payments to DBE and non-DBE subcontractors shall be included with the Contractor's invoice and Application for Payment submitted to Metro on the form titled, "Subcontractor Monthly Utilization Report."

§ 5.2.2.2 Prompt Payment Retainage. If retainage is withheld by Contractor from any Subcontractors, Contractor is required to return any retainage payment to those DBE and non-DBE subcontractors within the timing specified in any Governmental Requirement or no later than 7 days, whichever is less, from the receipt of the retainage payment related to the Subcontractor's Work. Any delay or postponement of payment from the above referenced time frame is permitted only if Contractor has made a showing of good cause satisfactory to Metro.

§ 5.2.2.3 Subcontract Provisions Any subcontracts related to the Contract must contain adequate provisions to define a sound and complete Contract and must include all provisions required by any Contract Document, including those set forth in this and other Sections of this Article 5. By way of example only, all subcontracts shall contain contractual provisions or conditions that allow for:

1. Administrative, contractual, or legal remedies in instances where subcontractors violate or breach contract terms, including sanctions and penalties as may be appropriate.

2. Termination for cause and for convenience including the manner by which it will be effected and the basis for settlement.

3. Without limitation to any similar requirement set forth in any Contract Document (including Articles 16 and 17 of these General Conditions that may require additional similar provisions), the following provisions if included in any Contract Documents:

   Breach of Contract; Remedies
   Buy America

A. Clean Air
B. Clean Water
C. Civil Rights
D. Nondiscrimination
E. Equal Employment Opportunity
F. Americans with Disabilities Act
G. ADA Access Requirements

Debarment and Suspension
Disadvantaged Business Enterprise (DBE)
Disclaimer of Federal Government Obligations or Liability
Dispute Resolution
Employee Protections Non-Construction (Contract Work Hours & Safety Standards Act)
Employee Protections (Davis Bacon, Copeland, Anti-Kickback Acts)
Employee Eligibility Verification
Environmental
A. Clean Air
B. Clean Air Requirements for Transit Operations
C. Clean Water

Energy Conservation
Federal Changes
Fraud and False or Fraudulent Statements or Related Acts
Governing Law; Choice if Judicial Forum
Incorporation of Federal Transit Administration Terms
Lobbying Restrictions
National Intelligent Transportation Systems Architecture & Standards
Ownership, Identification, and Confidentiality of Work
Patents and Rights in Data and Copyrights
Privacy Act Requirements
Prohibited Interests
Prohibited Weapons and Materials
Record Retention & Access
Subcontractors
U.S. Product and Service Preference
A. Buy America
B. Cargo preference
C. Fly America

Without limitation to the requirements any such provision, Contractor will take such action with respect to any Subcontractor or procurements as Metro or the U.S. Department of Transportation may direct as means of enforcing such provisions.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by Contractor to be a Subcontractor that is not identified in the Appendix, Contractor shall propose another to whom the Owner or Architect has no reasonable objection.

§ 5.2.4 The Contractor shall not substitute any Subcontractor named in the Appendix or thereafter approved by Metro, without the express written consent of Metro.

§ 5.3 SUBCONTRACTUAL RELATIONS

§ 5.3.1 By appropriate written agreement, Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by any Contract Document assumes toward the Owner and Architect; provided, however that no such requirement or provision shall be deemed to relieve Contractor for those obligations and responsibilities. The Contractor's agreement with each Subcontractor shall contain all federally mandated provisions required by any Contract Document to be included therein. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be

performed by the Subcontractor so that any subcontracting of Work will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that Contractor, by the Contract Documents, has against the Owner. Where appropriate and as otherwise required by any Contract Document, Contractor shall require each Subcontractor to enter into similar agreements with its Subcontractors. Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective Subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after a termination of the Contract by the Owner pursuant to Article 14 and only for those subcontract agreements that the Owner then accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract for any performance following the effective date of any such assignment.

§ 5.4.2 If as of the effective date of any such assignment, the Work has been suspended for more than 30 days, Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Following the effective date of any assignment to Owner under this Section 5.4, Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract following the effective date of such assignment.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on any Project site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 INTENTIONALLY DELETED.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor/subcontractor with the Work of the Contractor, who shall cooperate with them. Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces (which shall not be construed to include those of any other contractors/subcontractors retained by Metro for such purposes), the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors/subcontractors reasonable opportunity for

introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractors/subcontractors, Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's/subcontractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 Contractor shall reimburse the Owner for costs Owner incurs, including those payable to separate contractors/subcontractors because of Contractor's delays, improperly timed activities or any damaged, deficient or defective Work or other failure to comply with the Contract Documents. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's/subcontractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 Without limitation to any other right, remedy or recourse of Metro in respect to any such matter, Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors/subcontractors as provided in Section 10.2.5.

§ 6.2.5 The Owner (whenever using its own forces) and each separate contractors/subcontractors shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors/subcontractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect. A Construction Change Directive requires agreement by the Owner and Architect and, except where otherwise required by any Contract Document, may or may not be agreed to by the Contractor; an order for a minor change in the Work must be approved by the Owner and relayed by the Architect, and Contractor shall comply with such directive.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work. Unless otherwise provided in the Change Order, a Construction Change Directive or order for a minor change in the Work, the Contract Sum and the Contract Time (nor any scheduled performance time or milestone in respect of the Work) shall be altered.

§ 7.1.4 The terms of all performance bonds, labor and material bonds and other bonds required by the Contract Documents shall provide that such shall be automatically increased in amount and extended in time to cover full payment and full and faithful performance of the Contract in the event of Change Orders, regardless of the amount of time or money involved. It is Contractor's responsibility to notify his surety of any changes affecting the general scope of work or change in the Contract price or time and shall require such surety to acknowledge the requirements of this Section 7.1.4 to Metro in writing.

§ 7.1.5 At any time during the continuance of the Contract the Surety on any bond becomes unacceptable to Owner for financial reasons, the Owner has the right to require additional and sufficient sureties which Contractor shall furnish to the satisfaction of the Owner within ten (10) days after written notice to do so without any additional increase in the Contract Sum, unless the scope of the Work has been enlarged.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

- **.1** The change in the Work;
- **.2** The amount of the adjustment, if any, in the Contract Sum; and
- **.3** The extent of the adjustment, if any, in the Contract Time.

§ 7.2.2 For any Work for which unit prices or other matters applicable to any Change Order, have not been established by the Proposal or any other Contract Document, Contractor shall prepare and submit for approval of a statement covering the Work contemplated by the Change Order. The Proposal has identified all costs related to the Work, broken down as to labor, material, tool rental, and subcontracted Work. To these items, but only if the Change Order is for additional Work, shall be added a percentage of the costs of labor, material, and equipment as the Contractor's fee for overhead and profit as set forth in the Proposal. Also included shall be a percent of value of subcontracted Work, if any. If the Change Order is for a decreased amount of Work, credit to Metro shall be one hundred percent (100%) of the accrued savings, including direct costs, and related overhead and profit allocations.

§ 7.2.3 INTENTIONALLY DELETED

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- **.1** Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- **.2** Unit prices stated in the Contract Documents or subsequently agreed upon and as otherwise provided in Section 7.3.4;
- **.3** Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- **.4** As provided in Section 7.3.7.

§ 7.3.4. If the Construction Change Directive is for a decreased amount of Work, credit to Metro shall be one hundred percent (100%) of the accrued savings, including costs of labor, material, and equipment, tool rental, and subcontracted Work and other matters based on those stated in the Proposal, as subsequently adjusted by any Change Order and any related overhead and profit allocations.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the

Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data.

Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a decrease in the Contract Sum shall be actual cost including the Contractor's fee for overhead and profit as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

§ 7.4.1 The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

§ 7.4.2 Architect-initiated clarifications will be issued in AIA Document G710, Architect's Supplemental Instructions (ASI). The Contractor, within 10 days of date of issuance of ASI, shall respond in either of the following ways:

1. Accept the ASI as issued by signing, dating, and returning two copies.
2. State in writing that the ASI is not acceptable because of a need to change the Contract Sum and/or Contract Time, and issue a Contractor Proposal outlining changes.

§ 7.4.3 If neither response is received within 10 days, the conditions of the ASI shall become binding on all parties and accepted into the Contract Documents, and the Contractor shall waive his right to file a claim for an increase in Contract Sum and/or Contract Time.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending litigation; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.2.1 Subsequent to the Architect's review and comments, the Contractor's Schedule of Value shall be reviewed and approved in writing by Metro.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2., for completed portions of the Work and containing all requirements of these General conditions and any other Contract Document. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents. The Form of Application for Payment shall be AIA Document G-702, 'Application and Certification for Payment,' supported by AIA Document G-702A, 'Continuation Sheet.' The Contractor shall submit "Certified Payroll Report" and partial lien waivers with each application for payment in a form

acceptable to Owner.

§9.3.1.1 As provided in Section 7.3.9, such applications shall include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§9.3.1.2 Notwithstanding anything contained in any Contract Document to the contrary, Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor (including any material or equipment supplier), unless such Work has been performed by others whom the Contractor intends to pay. The Contractor is subject to prosecution under the statute of Fraud if Application for Payment includes a request for money for which the Contractor does not intend to pay a Subcontractor (including any material or equipment supplier). If the Owner pays the full price for the Work performed by a Subcontractor (including any material or equipment supplier) that is identified on the Application for Payment the Contractor is obligated to pay such Subcontractor and may not discount the cost for such Work.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment (but only if so requested in writing by Metro, otherwise title to the same and all other Work shall remain with Contractor until such time as all Work has been accepted by Metro) or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the Project site.

§ 9.3.3 The Contractor warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors (including any material or equipment supplier) or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.3.4 The full Contract retainage ten (10%) may be reinstated if the manner of completion of the Work and its progress do not remain satisfactory to the Architect and the Owner, or if any surety on any bond required to be furnished by any Contract Document withholds its consent, or for other good and sufficient reasons.

§ 9.3.5 INTENTIONALLY DELETED

§9.3.6 Applications for Payment shall be submitted directly to the Architect who will review and submit to the Owner. All invoices and Applications for Payment shall be numbered, dated and submitted in duplicate, and contain full descriptive information of products, equipment, materials, work or services furnished. All invoices and Applications for Payment and related correspondence shall reference the Grant Administrator and the Project together with any other requirement that the Grant Administrator may reasonably require from time to time. Separate invoices shall be submitted for each purchase order or work (task) order. All invoices and all Applications for Payment also shall include all statements, documentation, information and other materials required by any Contract Document, including any Governmental Requirement.

Contractors utilizing Subcontractors shall provide a detailed breakout by Contractor and each Subcontractor (whether or not a DBE Subcontractor, but identifying each DBE Subcontractor as such, if any) on each invoice submitted for payment. All invoices and Applications for Payment shall contain a summary section which shows current payment and cumulative. Contractor shall submit this information on the "Subcontractor Monthly Utilization Report" form. Contractor is required to pay its DBE and non-DBE subcontractors performing work related to this Contract for satisfactory performance of that work in accordance with the timing set forth in any Governmental Requirement or no later than thirty days, whichever is less, after the Contractor's receipt of payment for that work from Metro. If retainage is withheld from Subcontractors, Contractor is required to return any retainage payment to this DBE and non-DBE subcontractors with the timing set forth in any Governmental Requirement or no later than thirty days, whichever is less, whichever is less from receipt of the retainage

payment related to the Subcontractor's Work. Any delay or postponement of payment from the above referenced time frame may occur only if Contractor has made a showing of good cause satisfactory to Metro. Metro may perform random audits and contact DBE Subcontractors to confirm the reported participation. Failure to meet the specified DBE goal applicable to the Contract, if any, without documented evidence of a good faith effort may result in the termination of the Contract.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a separate contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual damages for the anticipated delay;
- **.7** repeated failure to carry out the Work in accordance with the Contract Documents;
- **.8** unsatisfactory prosecution of the Work by the Contractor; or,
- **.9** failure to submit Certified Payroll Receipts, partial lien waivers and other documents as may be required by the Contract Documents, any Governmental Requirement or by Architect or the Representative.

§ 9.5.2 In addition, the Owner may withhold or cause to be withheld from the Contractor as much of the accrued payment or advances as may be considered necessary a) to pay the laborers or mechanics, including apprentices and trainees, employed by the Contractor or Subcontractor on the Work the full amount of wages required by the Contract, and b) to satisfy any liability of any Contractor.

§ 9.5.3 If Contractor or any Subcontractor fails to pay any laborer or mechanic, including apprentices and trainees, employed or working on the site of the Work, all or part of the wages required by the Contract, the Owner may, after written notice to Contractor take such action as may be necessary to cause suspension of any further payments or advances until such violations have ceased.

§ 9.5.4 Right to Offset/Set-Off; Payments Under Protest. The Owner, without waiver or limitation of any of its other rights, remedies or recourse, may at any time withhold, deduct or set-off from any amounts owed to Contractor under any invoice or Application for Payment or otherwise in connection with the Contract, or any other agreement between Contractor and Owner, any amounts then owed by Contractor to Metro (including amounts owed by Contractor to Metro by application of any provision of these General Conditions or any other Contract Document or pursuant to Contractor's obligation to indemnify the Owner against third party claims arising out of Contractor's performance of Work under or in respect of the Contract).

If any time a dispute shall arise as to any amount or sum of money to be paid by one party to the other party, under the provisions of any Contract Document, the party against whom the obligation to pay the money is asserted shall have the right to make payment "under protest" and such payment shall not be regarded as a voluntary payment and there is hereby reserved the right on the party of said party to institute permitted actions for the recovery of such protested sum. If in any such proceeding, it shall be finally determined that there was no legal obligation on the part of said party to pay such sum or hereof, said party shall be entitled to recover such sum or so much thereof as it was not legally required to pay under the provisions of the Contract Document, together with interest thereon at 8% per annum if paid to the other party. If at any time a dispute shall arise between the parties as to any Work to be performed by either of them under the provisions hereof, the party against whom the obligation to perform the Work is asserted my perform such work and pay the cost thereof "under protest" and the performance of such work shall in no event be regarded as a voluntary performance and there shall survive the right on the part of said party to institute permitted actions for the recovery of the costs of such work, and if it shall be adjudged that there was no legal obligation on the party of said party to perform the same or any part thereof, said party shall be entitled to recover the cost of such work or the costs of so much thereof as said party was not legally required to perform under the provisions of the Contract Document, together with interest thereon at 8% per annum.

§ 9.5.4 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.5 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, subject to any other provision in any Contract Document, including Section 9.5, Owner shall make payment within 30 days in the manner provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to its Subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid all Subcontractors and all other service firms amounts paid by the Owner to the Contractor for subcontracted Work or for which Contractor requested payment or reimbursement. If the Contractor fails to furnish such evidence within seven days after any such request, Metro shall have the right to contact

Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by any Governmental Requirement; provided that no such Governmental Requirement shall relieve Contractor of any related obligation.

§ 9.6.5 Contractor payments to any service provider that is not a Subcontractor shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work. No Work shall be deemed accepted unless and until Metro has accepted Work in writing.

§ 9.6.7 Payments received from Metro by the Contractor for Work performed by any Subcontractors shall be received by Contractor for the benefit for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor; provided, however all such payments shall be paid to Subcontract as and when required by the Contract Documents.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within 30 days of receipt of the amount certified by the Architect (other than any amount thereof that may be disputed by Metro, in which event the parties shall proceed in accordance with Article 15) or as may have been agreed to in any dispute resolution proceeding, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when each and every component of the Work as itemized in the Schedule of Values, is at least 95% complete and operational or may be occupied or utilized for its intended purpose."

§ 9.8.2 When the Contractor considers that the Work is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.8.6 Warranties required by the Contract Documents shall commence on the date of Owner acceptance of all completed Work.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by appropriate Governmental Authorities. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed in writing, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work is completed in accordance with and in compliance with the Contract Documents and the Contract has been fully and satisfactorily performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with and in full compliance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment , (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner, and (6) all submittals as required by the Project Manual or any other Contract Documents to achieve Project Closeout. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

.1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
.2 failure of the Work to comply with the requirements of the Contract Documents; or
.3 Terms of any warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those claims that have previously made in writing and are identified by that payee as of the date of final payment as remaining unsettled at the time of final Application for Payment.

§ 9.11 Nothing in Article 9 shall be construed to preclude Metro from disputing in good faith any certificate or certification of any nature made by Architect pursuant to Article 9.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

.1 employees on the Work and other persons who may be affected thereby;
.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the any Subcontractors; and
.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by all Governmental Requirements applicable to the Work and Contractor's performance under or in respect of the Contract and the Contract Documents, including those bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable solely and directly to acts or omissions of the Owner or anyone directly or indirectly employed by Owner, or by anyone for whose acts Owner may be liable. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or any Project site or other premises to be an unsafe condition.

§ 10.2.8 Injury Or Damage To Person Or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 2 business days after discovery. The

notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding any Environmental Regulation. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on any Project site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing. Failure to notify the Owner and/or proceeding with Work in the affected area after knowing or recognizing the possibility of the presence of hazardous materials or existence of any other occurrence potentially giving rise to any liability under or in respect of any Environmental Regulation shall constitute a negligent act on the part of Contractor and Contractor shall indemnify Metro from litigation and acts, penalties, fines and restrictions as may be imposed by any Environmental Regulation.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 INTENTIONALLY DELETED

§ 10.3.4 INTENTIONALLY DELETED

§ 10.3.5 Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the Project site, or (2) where the Contractor fails to perform its obligations any provision of the Contract Documents, except to the extent that the cost and expense are due to the Owner's negligence.

§ 10.3.6 INTENTIONALLY DELETED

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's reasonable discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor and Metro from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- **.1** Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- **.2** Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- **.3** Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- **.4** Claims for damages insured by usual personal injury liability coverage;

.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;

.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;

.7 Claims for bodily injury or property damage arising out of completed operations; and

.8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified below or required by Law, whichever coverage is greater, and shall include blanket contractual liability insurance for all indemnification obligations of Contractor under these General Conditions or any other Contract Document. All coverages shall be written on an occurrence basis, and shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents. Metro (which for purposes of the Article 11 shall include all Metro Indemnified Parties) shall be named as additional insureds on all policies, except for the Professional Liability and Workers Compensations policies.

.1 Workers Compensation:

a. State: Statutory

b. Applicable Federal (i.e. Longshoreman's): Statutory

c. Employer's Liability:

Bodily Injury by Accident $500,000 each incident Bodily Injury by Disease: $500,000 each employee

Bodily Injury by Disease: $500,000 policy limit

Contractor and each Subcontractor shall maintain adequate worker's compensation insurance in conformance with the laws of the State of Nebraska and any other applicable Governmental Requirement to cover all employees during performance of services, or during delivery, installation, assembly or related services in conjunction with the Contract. Contractor and each Subcontractor will also agree to hold Metro harmless from any costs due to accident or other liabilities that may be subject to the Worker's Compensation Law, including those costs and damages contemplated by the indemnification obligations of Contractor required by any Contract Document, including Section 3.18.3.

.2 Commercial General Liability (including Premises-Operations; Independent Contractor's Protective; Products and Completed Operation; Broad Form Property Damage, Broad Form CGL; Blanket Contractual; X, C, and U).

a. Bodily Injury:

Each Occurrence	$1,000,000.00 per person
Aggregate per occurrence	$5,000,000.00.

b. Property Damage:

Each Occurrence	$1,000,000.00 per person
Aggregate per occurrence	$5,000,000.00

c. Personal Injury:

Each Occurrence	$1,000,000.00 per person
Aggregate per occurrence	$5,000,000.00

d. Products Liability and Completed Operations Insurance to be maintained for two (2) years after final payment.

e. Property Damage Liability Insurance shall include X, C, or U coverage if exposure exists.

f. Broad Form Property Damage shall include Completed Blanket Operations.

.3 Blanket Contractual Liability:

b. Bodily Injury:

Each Occurrence	$1,000,000.00	per person
Aggregate per occurrence	$5,000,000.00	

b. Property Damage:

Each Occurrence	$1,000,000.00
Aggregate per occurrence	$5,000,000.00

.4 Comprehensive Automobile Liability (including owned, hired, and non-owned vehicles):

Bodily Injury:

Each Occurrence	$1,000,000.00	per person
Aggregate per occurrence	$5,000,000.00	

Property Damage

Each Occurrence	$1,000,000.00	per person
Aggregate per occurrence	$5,000,000.00	

Contractor shall procure and maintain at all times during the term of the Contract Commercial General Liability insurance for liability arising out the performance of and under the Contract and other operations of the Contractor and each Subcontractor, including any intentional or other act, error, omission, including any negligent act, of thereof, including its and their respective employees, agents and representatives. Contractor or its employees The policy(ies) shall include Comprehensive Automobile Liability coverage for all vehicles, licensed or unlicensed, on or off Metro premises and any Project site, whether the vehicles are owned, hired or non-owned, covering use by or on behalf of the Contractor and each Subcontractor during the performance of under or in respect of the Contract. The policy (ies) shall include coverage for the Contractor's and its subcontractors' products and completed operations. Contractor shall use ISO Form CG 20 10 11 85 (or OCG 20 26 0704 in the case of a Blanket Endorsement), or such other additional insured forms acceptable to Metro.

The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) coverage for claims caused or arising, in whole or in part, by the performance of and under the Contract and other operations of the Contractor and each Subcontractor, including any intentional or other act, error, omission, including any negligent act, of thereof, including its and their respective employees, agents and representatives and (2) Contractor's negligent acts or omissions during the Contractor's operations, including during the Contractor's completed operations.

.5 Professional Liability Insurance	$1,000,000.00	Each Occurrence
	$1,000,000.00	Annual Aggregate

Where applicable, Contractor shall procure and maintain professional liability insurance covering damages caused by any intentional or other act, error, omission, including any negligent act, of the Contractor or its employees with regard to Contractor's performance and arising from the work performed under the Contract. Insurance for negligent acts, errors, or omissions committed or alleged to have been committed by Contractor and professional subcontractors shall be provided.

The Contractor will maintain the above Professional Liability coverage and limits for a minimum of two years beyond the final acceptance of all Work. In lieu of the foregoing, Metro will accept a certified copy of the policy with an endorsement extending the discovery period for two years and that Metro will receive written notice within thirty days of any change in the extended discovery period.

In lieu of providing professional liability coverage for professional Subcontractors, Contractor may cause professional subcontractors to independently comply with this Section.

.6 Pollution Liability	$1,000,000	Each Occurrence
	$1,000,000	Annual Aggregate

Where applicable, the Contractor shall obtain and keep in effect until all Work has been finally accepted by Metro,

Pollution Liability Insurance including clean up and remediation costs arising out of the work or services to be performed under the purchase order or the Contract. Coverage shall apply to the above for premises and operations, products and completed operations and automobile liability. Automobile liability coverage may be satisfied by utilizing ISO Endorsement CA 9948 or equivalent.

.7 The insurer(s) for all policies of Contractor required insurance shall acknowledge and agree its policy (ies) is primary insurance and that it shall be liable for the full amount of any loss up to and including the total limit of liability without right of contribution from any other insurance or self-insurance Metro may have.

§11.1.3 Certificates of Insurance/Endorsements. Contractor shall be required to furnish certificates of insurance required by this Article 11 prior to execution of the Contract. The insurance should be written with companies acceptable to the Metro, and the companies should have a minimum A. M. Best's insurance rating of A-(VIII). The Certificate and the policies shall state that all Metro Indemnified Parties are named as additional insureds on the policies covered by the certificate, except Professional Liability and Workers Compensation. Metro will be given a 30-day notice prior to any decrease in limits or cancellation of any policy covered by the certificate of insurance.

a. In no event shall the total limit(s) of liability available for any one occurrence or accident be less than the amount shown in this Article 11.

b. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required in any contract Document and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness. The certificate of insurance shall specifically state that blanket contractual liability is applicable. Explosion, collapse, and underground coverage shall be included when the exposure exists.

c. In addition to the above certificates required herein, the Contractor shall furnish to the Owner copies of any endorsements that are subsequently issued amending coverage or limits. Pertaining to the "Other Insurance" clause in the Contractor's policy - the Insurance Certificate shall state that "any coverage afforded the certificate holder as an additional insured shall apply as primary and not excess or contributing to any insurance issued in the name of the certificate holder."

§11.1.4 Policies. Contractor shall be required to furnish to Metro copies of required insurance policies and relevant additional insured endorsements of insurance prior to Metro's execution of the contract. If copies of the required insurance policies or endorsements are then available, the Contractor shall be required to furnish certificates of insurance prior to execution of the contract, and thereafter furnish copies of the policies and additional insured endorsements, from time to time, whenever reasonably requested by Metro. The certificates (with the exception of Professional Liability and Workers Compensation coverage) shall specifically state that:

(1) Contractual liability coverage is applicable; and

(2) ***Metro and its directors, officers, Board members and employees are named as additional insureds on the policies covered by the certificate; using this specific wording: "Transit Authority of the City of Omaha, a body politic and corporate and a governmental subdivision of the State of Nebraska d/b/a Metro and its directors, officers, Board members and employees are named as additional insureds as respects general liability and where required by written contract. Any coverage afforded the certificate holder as an additional insured shall apply as primary and not excess or contributing to any insurance or self-insurance in the name of the certificate holder, and shall include a waiver of subrogation."***

§11.1.5 If the Owner is damaged by the failure of the Contractor to maintain the required insurance and to provide the required certificates to Owner, the Contractor shall bear all reasonable costs properly attributable thereto.

§11.1.6 Further, from time to time and whenever reasonably requested by Metro, the Contractor shall represent and warrant to Metro (1) the extent to which the insurance limits identified below have been, or may be, eroded due to paid or pending claims under the policies; and (2) the identity of other Persons covered as an additional insurer's obligation to pay defense costs under the policies is in addition to, and not part of the liability limits stated in the policies.

§ 11.2 PROPERTY INSURANCE

§ 11.2.1 Contractor shall also procure and maintain, in a company or companies lawfully authorized to do business in the State of Nebraska, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of any policy of insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, Contractor and all Subcontractors and Sub-subcontractors in the Project.

§ 11.2.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If this insurance is written with the stipulated amounts deductible under the terms of the policy, Contractor shall pay the difference attributable to deductions in any payments made by the insurance carrier on claims paid by this insurance.

§ 11.3.1.3 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.4 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.1.5 WAIVERS OF SUBROGATION AS TO PROPERTY INSURANCE

The Owner and Contractor waive all rights against (1) each other and any of their Subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Contractor as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged

§ 11.3.2 A loss insured under the Contractor's property insurance shall be adjusted by the Contractor as fiduciary and made payable to the Contractor as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.3 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Contractor's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Contractor shall deposit in a separate account proceeds so received, which the Contractor shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for

convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.4 The Contractor as fiduciary shall have the power to adjust and settle a loss with insurers and any of the parties interested.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 Performance Bond; Labor and Material Payment Bond. Contractor shall furnish a performance bond covering faithful performance of the Contract and a separate labor and material payment bond. Each bond shall be made payable to The Transit Authority of the City of Omaha, as well as a 2-year Maintenance Bond All bonds shall be delivered to Metro contemporaneously with Contractor's execution of the Agreement and cannot be dated prior to the date of the execution of the Agreement. The performance bond shall be security for Contractor's full and faithful performance of the Contract. The labor and material payment bond shall be security for Contractor's payment of all persons, firms or corporations to whom Contractor may be liable for labor, materials, tools, equipment and other services in respect of the performance of the Work and as may otherwise be required by Neb. Rev. Stat Section 52-118. The form of each bond must be that provided in the RFP. Bonds shall be issued by a surety authorized to do business in the State of Nebraska that is listed in the current issue of the most recent revision of the United States Treasury Circular 570. The bonds shall initially be in the amount of 100% of the Contract Sum (reflected in United States Dollars), but each shall expressly provide that for the life of the Contract, the bond shall be maintained to reflect additional values incorporated by approved Change Orders. A current power of attorney for the person signing the bond as a representative of the surety must be attached to the bonds. If specifically requested by Metro, Contractor shall obtain and submit information on the surety's financial strength rating.

§11.4.2 Maintenance Bond. Prior to final payment, Contractor shall furnish separate maintenance (or guarantee) bonds in form acceptable to Metro written by the same corporate surety that provides the performance bond for the Contract. The maintenance bond shall secure the Contractor's obligation to replace or repair defective products, equipment and materials and faulty workmanship for a minimum period of two (2) years after substantial completion and shall be written in an amount equal to one hundred percent (100%) of the Contract Sum, as adjusted (if at all).

If used, any letter of credit in lieu ("**LOC**") of a bond shall be irrevocable, unconditional, and issued by an acceptable federally insured financial institution. The LOC must cover the entire period of performance or may be submitted with an initial expiration date, which is a minimum period of one year from the date of issuance, with a provision, which states that the LOC is automatically extended without amendment for one year from the expiration date, or any future expiration date, until the period of performance is completed. The period of performance shall not end until resolution of all claims filed against the payment bond during the one-year period following final payment. The effective date of the two (2) year Maintenance Bond is the date of Substantial Completion.

§ 11.4.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at Contractor's expense without change in the Contract Time or Contract Sum.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor/subcontractor retained by Metro in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 Before Or After Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5 or any other Contract Document, if, within two years after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the two-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The two-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The two-year period for correction of Work shall be extended by one year after corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the two-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 ADDITIONAL REQUIREMENTS

§13.1 SERVICE MANUAL.

Contractor will provide at least one (1) copy of a service manual and at least one (1) copy of wiring schematics for individual components and other schematics and drawings as may be applicable to any equipment or project work in question

§13.2 TRAINING.

Contractor shall properly train Metro personnel in the operation and maintenance, to include preventive maintenance, of any applicable equipment supplied as part of the Work.

§13.3 DELIVERY

Materials, products and/or equipment requested by Metro to be delivered to Metro shall be coordinated with the Architect and Owner for delivery.

Metro will assume custody of property at other locations, if so directed in writing by Metro. Packing slips shall be furnished with the delivery of each shipment. Metro reserves the right to inspect all deliveries before acceptance. All external components shall be wrapped for protection against damage during shipping and handling. Each specified unit shall be delivered to Metro in first class condition and the Contractor shall assume all responsibility and liability for said delivery. Metro reserves the right to extend delivery or installation, postpone delivery or installation, or reschedule delivery or installation in case the delivery or installation of products, equipment or materials under the Contract shall be necessarily delayed because of strike, injunction, civil disturbance, government controls, or by reason of any cause of circumstance beyond the control of Metro.

§13.4 RIGHT TO INSPECT WORK.

Metro reserves the right and shall be at liberty to inspect all Work any time and shall have the right to reject all materials and workmanship that do not conform with the Contract Documents; provided, however, that Metro is under no duty to make such inspection, and no inspection so made shall relieve Contractor from any obligation to furnish any Work as required by the Contract Documents.

§13.5 CONTRACTOR'S PERSONNEL.

Without limitation or prejudice to any other provision in these General conditions or any other Contract Document, all Work in respect of the Contract shall be performed by the Contractor or under its supervision and all personnel engaged in the work shall be fully qualified and authorized under all applicable Governmental Requirements to perform such Work. Any change in the key personnel, as described in the Proposal, shall be subject to the written approval of Metro; such approval shall not be unreasonably withheld. The parties agree that at all times during the entire term of this Agreement that shall serve as the primary staff person(s) of Contractor to undertake, render and oversee all of the services of this Agreement subject to the next sentence on Metro's right to remove personnel. Metro reserves the right to require the Contractor to remove any personnel and or subcontractors for any cause and as otherwise permitted in these General conditions or any other Contract Document.

§13.6 CONTRACTOR'S RESPONSIBILITY.

No advantage shall be taken by Contractor or any Subcontractor of the omission of any part or detail that goes to make any products, equipment or materials complete and operable for use by Metro. Without limitation or prejudice to any other provision in these General conditions or any other Contract Document In case of any variance, the Specification shall take precedence over Contractor's or Subcontractor's own specifications. Contractor shall assume responsibility for all products, equipment, materials and services used and other Work whether the same is manufactured by the Contractor or purchased ready made from a source other than Contractor.

§13.6.1 No limitation of Cumulative Responsibilities. Without limitation to any other provision in these General Conditions or in any other Contract Document, and whether or not sometimes so expressly stated therein, all duties and obligations imposed on Contractor by the Contract Documents and related rights, recourse and remedies available to Metro thereunder shall be in addition to and not a limitation of duties, obligations, rights, recourse and remedies otherwise imposed or available at Law or in equity.

§13.7 DISCLOSURE OF PROPRIETARY INFORMATION.

By submission of it Proposal, Contractor acknowledges that Metro is a public body to which Laws of the State of Nebraska governing the disclosure of public records (Neb. Rev. Stat. 84-712 to 84-712.09, inclusive; "**Public Records Statutes**") have application. To the extent that Contractor in its Proposal may have attempted to restrict the disclosure of scientific and technological innovations in which it has a proprietary interest, or other information that it believes is protected from public disclosure by Law by (a) marking each page of each such document prominently in at least 16 point font with the words "Proprietary Information", (b) printing each page of each such document in a different color paper than the paper which the remainder of the proposal is printed; and (c) segregating each page of each such document in a sealed envelope, which shall prominently display, on the outside, the words "**Proprietary Information**" in at least 16 point font, along with the name and address of Contractor. If access to documents marked "Proprietary Information" (and otherwise complying with (a) through (c) above), is requested pursuant to the Public Records Statutes, Metro will notify Contractor of the request. Contractor shall have the burden to establish that such documents are exempt from disclosure under the Public Records Statutes, and Metro shall not be responsible to undertake any act or action to prevent any such disclosure. Notwithstanding the foregoing, Metro reserves the right to release any documents requested pursuant to the Public Records Statutes if

Metro determines that such information is a public record under the Public Records Statutes.

§13.8 TEST AND INSPECTIONS

§13.8.1 Tests, inspections and approval of portion of the Work required by the Contract Documents or by Governmental Requirement shall be made at an appropriate time. The Contractor shall make arrangements with the Architect for required inspections. Copies of such test results and inspections shall be filed with the Architect and Metro. Contractor shall give the testing laboratory, the Architect and Metro timely notice of when and where tests and inspections are needed to meet Contract requirements.

§ 13.8.2 Inspection or testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

§ 13.8.3 If the Architect, Owner or any applicable Governmental Authority determine that portions of the Work require additional testing, inspection or approval not included under Section 13.8.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures.

§ 13.8.4 If such procedures for testing, inspection or approval under Sections 13.8.1 and 13.8.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.8.5 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.8.6 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.8.7 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

ARTICLE 14 TERMINATION/SUSPENSION OF THE CONTRACT; RELATED MATTERS

§ 14.1 TERMINATION FOR CONVENIENCE.

Whenever deemed by Metro to be in its best interest, the Contract, and any part thereof, may be terminated by Metro at any time by written notice to Contractor ("Notice of Termination for Convenience"). Such termination will be effective as of the date specified in the Notice of Termination for Convenience. Unless otherwise so specified by Metro in the Notice of Termination for Convenience, Contractor shall immediately stop all Work and shall issue wriitten notice to each Subcontractor to cease all Work. If Metro elects to terminate the Contract for convenience, then Metro shall be responsible to pay Contractor only for all authorized Work performed up to the date of termination that conforms to the Contract Documents, together with any profit thereupon calculated as set forth in the Contract; provided that there shall not be any allocation of profit for unperformed, remaining or incomplete Work. In no event shall the aggregate charges to be paid by Metro pursuant to the preceding sentence exceed the Contract Sum. In addition, Metro must reimburse Contractor an amount equal to the sum of all out-of-pocket costs and expenses, reasonably and necessarily incurred by Contractor (i) to withdraw its equipment and personnel from the Work and to terminate any subcontract in respect of the Work that is not assumed by Metro as specified in the Notice of Termination for Convenience; provided, however, that Contractor shall not be paid for any Work undertaken by Contractor or by any Subcontractor after Contractor's receipt of Notice of Termination for Convenience or for Work that Contractor could reasonably have avoided Contractor.

§ 14.1.1 Contractor shall promptly submit its claim for payment in the form of an invoice to Metro for the amount of reimbursement claimed by Contractor by application of § 14.1, together with all supporting information and documentation reasonably demonstrating to Metro that Contractor's claim is allowable, including without limitation, lien waivers from Contractor and all Subcontractors in respect of any Work, whether or not then completed. Contractor must also contemporaneously deliver the assignment of any subcontract that Metro specifies in the Notice of Termination for Convenience. Unless disputed in good faith by Metro, Contractor shall be paid the amount

of Contractor's claim within thirty (30) days after receipt of the invoice with the rqeuired assignments and any property in Contractor's possession belonging to Metro.

§ 14.1.2 Contractor shall have no claim, right, remedy or entitlement for damages, compensation or equitable relief for such early termination of the Contract other than as provided in this Section 14.1. Except as expressly provided in this 14.1, contractor hereby irrevocably waives any other rights, remedies and recourse of any nature that it may have against metro, DOT/FTA/the federal government under or in respect of this contract and the transactions contemplated thereby under any theory of recovery whatsoever under any theory of law whatsoever, whether at law or in equity, including by way of example only, by statute, tort, contract, warranty, indemnity or subrogation.

§ 14.2 SUSPENSION.

Metro may, without cause, order Contractor to suspend, delay or interrupt the Work in whole or in part for such period of time as the owner may determine. The allocated time for performance shall be extended for time caused by the suspension, delay or interruption. The Contract Sum may be adjusted for additional costs to Contractor related directly to the suspension, delay or interruption. Contractor shall have no claim, right, remedy or entitlement for damages, compensation or equitable relief for such suspension except as provided in the preceding sentence; provided, however that loss of unrealized revenue or profit is not is not an allowable cost recoverable due to Contract suspension, delay or interruption. Except as expressly provided in this 14.2, contractor hereby irrevocably waives any other rights, remedies and recourse of any nature that it may have against metro, DOT/FTA/the federal government under or in respect of this contract and the transactions contemplated thereby under any theory of recovery whatsoever under any theory of law whatsoever, whether at law or in equity, including by way of example only, by statute, tort, contract, warranty, indemnity or subrogation.

§ 14.3 TERMINATION FOR CAUSE.

Metro shall have the right to terminate this Contract upon the occurrence of any Breach. For purposes of this Section 14.3, a "Default" shall occur whenever Contractor (or any of its Subcontractors) has failed to comply with or perform, in each instance fully and completely, any covenant, term, condition or other provision of the Contract that is applicable to Contractor. A "Breach" shall occur if there shall occur any of the following events or if there shall occur any Default that Contractor does not cure within any applicable (if any) hereinafter stated grace period:

(a) Any Default, other than a Default specified in Section 14.3 (b)through (d) (in which case the cure period, if any, for such Default shall be that specified in such Section), that remains uncured for ten (10) days after Contractor receives notice from Metro specifying the Default;

(b) Any representation or warranty made by Contractor or any Subcontractor in any Contract Document shall not be, or shall cease to be, not true accurate or complete in any material respect;

(c) There shall occur (whether by operation of law, novation or otherwise) any assignment of the Contract (or any right of Contractor under or in respect of the Contract) without Metro's prior written consent, which consent may be withheld by Metro in its sole judgment and absolute discretion;

(d) There shall occur any of the following events: (i) Contractor shall make any general arrangement or assignment for the benefit of creditors, (ii) Contractor becomes a "debtor" as defined in 11 U.S.C. § 101 or any successor statute thereto (unless, in the case of a petition filed against Contractor, such petition is dismissed within 60 days), (iii) the appointment of a trustee or receiver to take possession of substantially all of Contractor's assets or any of Contractor's interest in the Contractor (or any right of Contractor under or in respect of the Contract), (iv) the attachment, execution, or other judicial seizure of substantially all of Contractor's assets the appointment of a trustee or receiver to take possession of substantially all of Contractor's assets or any of Contractor's interest in the Contract (or any right of Contractor under or in respect of the Contract), where such seizure is not discharged within thirty (30) days; (v) Contractor becomes insolvent within the meaning of Generally Accepted Accounting Principles; (vi) Contractor (or any of its officers, members, shareholders, employees, partners of a felony in connection with the Work; (vii) Contractor attempts to evade any material provision of the Contract or to practice any fraud or deceit upon Metro; (viii) Contractor or any of its Subcontractor's to fully comply with the lawful directives or cooperate with requests of Metro or the Representative; (ix) Contractor fails to provide any insurance or bond within the period provided in the Contract Documents; (x)

Contractor fails to pay any sums due to Metro within 5 days of written notice from Metro; (xi) Contractor refuses or fails to timely commence or perform the Work; (xii) Contractor repeatedly refuses or fails to supply enough properly skilled workers or proper materials; (xiii) Contractor fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors; or (xiv) Contractor shall fail, refuse, or neglect to comply with any Governmental Requirement that is not cured within the earlier of (1) the time period that Metro is required by such Governmental Requirement to allow for cure or (2) ten (10) days.

§ 14.3.1 Whether or not sometimes so specified in these General Conditions or in any other Contract Documents, any election by Metro to terminate the Contract or to pursue any other right, remedy or recourse available to Metro under the Contract (whether or not related to any Breach or Default) are cumulative and may be exercised by Metro on one or more occasions; and none of them is to be construed as excluding Metro from pursing such remedy or any other or any additional right, priority, or remedy allowed or provided by, whether by Law or by any other Governmental Requirement or otherwise, each of which shall survive the expiration or termination of the Contract. In addition, the expiration or termination of the Contract will not relieve Contractor from any obligation or liability under or in respect of the Contract including by application of any indemnity provisions of the Contract or under any bond furnished by Contract pursuant to the Contract, all and each of which also shall survive the expiration or termination of the Contract. Without limitation to the generality of this Section 14.3.1, Contractor acknowledges that if the Contract is terminated for any reason contemplated by Section 14.3, such termination may also result in Contractor being declared to be ineligible for any subsequent contracts with Metro for a period of up to one year or such other/additional time that may be provided in any Governmental Requirement.

§ 14.4 WRONGFUL TERMINATION BY METRO.

In the event Metro may wrongfully terminate the Contract, and the parties do not otherwise agree in writing to re-instate or otherwise continue the Contract in accordance with its terms, Metro's termination shall be construed to be a termination for convenience and the provisions of Section 14.1 shall govern. Except as expressly provided in this Section 14.4, contractor hereby irrevocably waives any other rights, remedies and recourse of any nature that it may have against metro, DOT/FTA/the federal government under or in respect of this contract and the transactions contemplated thereby under any theory of recovery whatsoever under any theory of law whatsoever, whether at law or in equity, including by way of example only, by statute, tort, contract, warranty, indemnity or subrogation.

§ 14.5 CONTRACTOR'S RIGHT TO TERMINATE.

Contractor shall not be entitled to terminate the Contract for any reason except as provided in this Section 14.5. In the event Metro fails to timely pay to Contractor any undisputed amounts due pursuant to the terms of the Contract, Metro shall be in default under the Contract, but Metro shall be allowed thirty (30) days from receipt of a written notice of such default from Contractor in which to cure such default, after which Contractor may immediately terminate this Contract by written notice to Metro. Any amount disputed by Metro to be due under this Contract must be disputed in good faith. Except as expressly provided in this Section 14.6, contractor hereby irrevocably waives any other right, remedy and recourse of any nature that it may have against metro, DOT/FTA/the federal government under or in respect of the contract and the transactions contemplated thereby for any other default or breach by metro under or in respect of the contract under any theory of recovery whatsoever, whether at law or in equity, including by way of example only, by statute, tort, contract, warranty, indemnity or subrogation.

§ 14.6 FUTURE DEFAULT OR BREACH NOT WAIVED.

One or more waivers by Metro of a Default or Breach by Contractor will not be construed as a waiver of any other Default or Breach or any existing or future waiver of a Default or Breach of the same covenant, term, condition or provision of this Contract, whether of a similar or different character. The consent or approval by Metro to or of any act by Contractor requiring Metro's consent or approval will not waive or render unnecessary Metro's consent to or approval of any subsequent similar act by Contractor. No waiver or consent by Metro will be binding unless made in writing. Failure of Metro to insist upon strict performance under or in respect of the Contract shall not constitute a waiver of, or estoppel against, Metro requiring strict performance thereafter of the same or any other provision or requirement of the Contract, nor shall a waiver or estoppel in any one instance constitute a waiver or estoppel with respect to a later Default or Breach. Any delay or omission of any party to exercise any right under this Contract shall not impair the exercise of any such right, or any like right, accruing to it thereafter. No waiver of a right created by this Contract by one or more parties shall constitute a waiver of such right by the other party, except as may otherwise be required by Law. The failure of Metro to perform its obligations, including any failure by Metro to pay Contractor as and when required under this Contract shall not release Contractor from the performance of all

of its oblgation except as expressly permitted in Section 14.5.

§14.7 When Metro terminates the Contract for one of the reasons stated in Section 14.3, Contractor shall not be entitled to receive further payment (whether or not then outstanding, disputed or otherwise) until all Work has been completed.

§14.8 FUNDING CONTINGENCY.
The Contract is subject to financial assistance provided by DOT and the FTA, Contractor agrees that withdrawal or termination of all or part of any such financial assistance by DOT or the FTA may cause Metro to suspend or terminate the Contract.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 Definition A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 Notice Of Claims Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 Continuing Contract Performance Pending final resolution of a Claim, except as otherwise agreed in writing or as expressly provided in these General Conditions, Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 Claims For Additional Cost If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 Claims For Additional Time
§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction. For conditions of weather or conditions at the Project site, an average or usual number of inclement days when the Work cannot proceed are to be anticipated during the construction period and are not to be considered as warranting extension of time.

A. Time Extensions for Unusually Severe Weather:

Definitions:

1. Adverse Weather: Atmospheric conditions or the impact thereof at a definite time and place which are unfavorable to construction activities such that they prevent work on critical activities for 50 percent (50%) or more of the Contractor's scheduled work day.

2. Unusually Severe Weather: Weather which is more severe than the adverse weather anticipated for the season, location, or activity involved.

3. In order for any request for time extension due to unusually severe weather to be valid, the Contractor must document both of the following conditions:

a. The weather experienced at the project site during the Contract period is more severe than the adverse weather anticipated for the project location during any given

month; and

b. The unusually severe weather actually caused a delay to the completion of the project. The delay must be beyond the control and without fault or negligence by the Contractor.

c. The following schedule of monthly anticipated adverse weather delays will constitute the baseline for monthly weather time evaluations. The Contractor's Progress Schedule must reflect these anticipated adverse weather delays in all weather affected activities:

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY WORK DAYS BASED ON FIVE (5) DAY WORK WEEK

January	10	May	7	September	5
February	8	June	7	October	4
March	7	July	5	November	5
April	6	August	5	December	9

d. Upon receipt of the Notice to Proceed, and continuing throughout the Contract, the Contractor shall record on their daily construction report, the occurrence of adverse weather and resultant impact to normally scheduled work.

e. The number of actual adverse weather delay days shall include days impacted by actual adverse weather (even if adverse weather occurred in the previous month), and shall be calculated chronologically from the first to the last day of each month, and be recorded as full work days.

f. If the number of actual adverse weather delay days in a given month exceeds the number of days anticipated above, the difference shall be multiplied by 7/5 to convert any qualifying work day delays to calendar days. The resulting number of qualifying lost days shall be added to the Contract Time.

g. The determination that unusually severe weather occurred does not automatically mean an extension of time will be granted. The Contractor must substantiate the unusually severe weather delayed work activities on the critical path of the Progress Schedule.

h. Full consideration for equivalent fair weather work days shall be given. If the number of actual adverse weather delays in a given month is less than the number of days anticipated as indicated above, the difference shall be multiplied by 7/5 to convert any work day increases to calendar days. The resulting number of qualifying extra days will be accumulated and subtracted from any future month's days lost due to unusually severe weather.

i. The net cumulative total of extra days/lost days shall not result in a reduction of Contract Time and the Date of Substantial Completion shall not be changed as a result of unusually favorable weather.

j. In converting work days to calendar days, fractions 0.5 and greater shall be rounded up to the next whole number. Fractions less than 0.5 shall be dropped.

k. The Contractor shall summarize and report all actual adverse weather delay days for each month to the Architect by the tenth (10th) day of the following month. A narrative indicating the impact of adverse weather conditions on the scheduled critical

activities shall be included.

l. Any claim for extension of time due to unusually severe weather shall be submitted to the Architect within 15 days of the last day of the month in which the delay occurred. Resolution of any claim shall follow the procedures established by the General Conditions of the Contract for Construction and as prescribed above.

m. The Contractor shall include and indicate the monthly anticipated adverse weather days, listed above, in their Progress Schedule.

n. The Contractor shall indicate the approved adverse weather days (whether less or more than the anticipated delays) in their monthly Progress Schedule update.

§ 15.1.5.3 INTENTIONALLY DELETED

§ 15.1.6 Claims For Consequential Damages

To the fullest extent permitted by applicable law, in no event shall a party be liable to the other party under or in respect of the contract or as a result of such party's breach of, or failure to comply with, any covenants, terms, conditions or other provisions of the contract any indirect, incidental, punitive, special or consequential damages, including damages based on loss of profits, revenue, or use, lost profits, lost sales or lost revenues, a multiple of earnings or similar measure of damages incurred by such party, damages to reputation, under, or in respect of, or otherwise arising out of, the contract and any transaction contemplated by thereby or any course of conduct, course of dealing, statements or actions of any of them relating thereto), except to the extent such damages are required to be paid by a party to a third party with respect to a third party claim made against that party. For avoidance of any doubt, no parent, affiliate, or subcontractor and none of its r their respective officers, directors, shareholders, dontractors subcontractors, partners, members, shareholders joint venture participant or similar persons shall be construed to be a third party within the meaning of the exception herein provided. Each party hereby irrevocably waives any rights, remedies and recourse that it may have to recover or be allowed to recover such damages under any theory of law whatsoever, whether at law or in equity, including by way of example only, by statute, tort, contract, warranty, indemnity or subrogation.

§15.2 INITIAL DECISION – DISPUTE RESOLUTION

§15.2.1 Claims, excluding those arising under Sections 10.3 and 10.4 shall be referred to the Owner unless otherwise indicated in the Agreement. Except for those Claims excluded **b**y this Section 15.2.1, an initial decision shall be required as a condition precedent to litigation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§15.2.2 The Initial Decision Maker will review Claims and take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to litigation.

§15.2.6 If a claim has not been resolved after consideration of the foregoing, and of further evidence presented by the parties, or requested by the Architect, the dispute shall be decided by the Representative/Grant Administrator/Other as Initial Decision Maker, who shall reduce this decision to writing and furnish a copy thereof to the Contractor. The decision shall be final and conclusive unless within ten (10) days from the date of receipt of such copy, the Contractor furnishes a written appeal addressed to the Executive Director of Metro, with copy to the Grant Administrator, for the determination of such appeals which shall be final and conclusive unless subsequently determined by a court of competent jurisdiction to have been fraudulent or capricious, or arbitrary, or so grossly erroneous as necessarily to imply bad faith, or not supported by any evidence. In connection with any appeal proceeding under this clause, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of its appeal. Pending final decision of a dispute and thereafter irrespective of the result or any appeal, Contractor shall proceed diligently with the performance of the Contract and in accordance with the Director of Procurement's decision.

§15.2.6.1 This clause does not preclude consideration of questions of law in connection with decisions provided for above; provided that nothing in this Contract shall be construed as making final the decision of any administrative official or board on a question of law. On procurement items in which the Federal Transit Administration (FTA) funding is involved, the Contractor shall be aware of protest procedures with the FTA Regional Office.

§15.2.7 In the event of a Claim against Contractor, Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

ARTICLE 16: CIVIL RIGHTS AND RELATED GOVERNMENTAL REQUIREMENTS

§16.1 NON DISCRIMINATION.

Contractor agrees to comply with Title VI of the Civil Rights Act of 1964, as amended, 42 U.S. C. 2000d, Section 303 of the Age Discrimination Act, as amended, 42 U. S.C. 6102, Section 202 of the Americans with Disabilities Act of 1990, 42 U. S. C. 12132, and Federal Transit Law at 49 U. S. C. 5332. Contractor shall also comply the most recent of edition of FTA Circular 4702.1 together with the Department of Justice enforcement of Title VI, the Civil Rights Act of 1964. Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, color, creed, national origin, sex, age, or disability. In addition, Contractor agrees to comply with applicable Federal implementing regulations and other implementing requirements FTA may issue. These regulations provide that no person shall, on the grounds of race, color, or national origin be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity included in or resulting from this Contract.

§16.2 EQUAL EMPLOYMENT OPPORTUNITY

Metro is an equal opportunity employer. Metro has agreed to comply with all applicable Federal civil rights Laws and implementing regulations. Apart from inconsistent requirements imposed by Federal laws or regulations, Metro has agreed to comply with the requirements of 49 U.S.C. § 5323(h)(3) by not using any Federal assistance awarded by FTA to support procurements using exclusionary or discriminatory specifications. In performing under or in respect of this Contract, Contractor shall at all times comply with the following requirements and shall include these requirements in each subcontract entered by Contrator in connection therewith, none of which shall not be modified, except to identify the Subcontractor who will be subject to its provisions. Without limitation to or prejudice to any other provision in the Contract, Contractor acknowledges that the following equal employment opportunity requirements apply to the Contract.

§16.2.1 Race, Creed, Color, National Origin, Disability, Age or Sex. In accordance with Title VII of the Civil Rights Act, as amended, 42 U. S. C. 2002e, and Federal transit laws at 49 U. S. C. 5332, Contractor agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor ("DOL") regulations. Office of Federal Contractor Compliance Programs, Equal Employment Opportunity, Department of Labor, 41 C.F.R. Parts 60 et seq., (which implement Executive Order No. 11246, relating to "Equal Employment Opportunity," as amended by Executive Order No. 11375, Amending Executive Order No. 11246 relating to Equal Employment Opportunity, 42 U. S. C. 2000e). Contractor agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, creed, sex, sexual orientation, gender identity, national origin, disability, or age. Such action shall include, but are not 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. In addition, the Contractor agrees to comply with any applicable Governmental Requirements, including Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of the Contract implementing requirements FTA may issue.

§16.2.1.1 Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by an appropriate agency of the Federal Government setting forth the requirements of these nondiscrimination provisions.

§16.2.1.2 Contractor will state, in all solicitations or advertisements for employees placed by or on behalf of Contractor, that all qualified applicants will receive consideration for employment without regard to race, color, sex, religion, national origin, or age.

§16.2.1.3 Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding a notice to be provided by the Owner, advising the labor union or workers' representative of the Contractor's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, as amended, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

§16.2.2 Age. In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. 623 and Federal transit law at 49 U. S. C. 5332, Contractor agrees to refrain from discrimination against present and prospective employees for reason of age. In addition Contractor agrees to comply with any implementing requirements the FTA may issue.

§16.2.3 Disabilities. In accordance with Section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. 12112, and Section 504 of the Rehabilitation Act of 1973, as amended, 29 U.S.C. § 794, Contractor agrees that it will comply with the requirements of U. S. Equal Employment Opportunity Commission (EEOC), "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 CFR Part 1630, pertaining to employment of persons with disabilities. In addition, Contractor agrees to comply with any implementing requirements FTA may issue. Contractor also agrees to include these requirements in each subcontract financed in whole or in part with federal assistance provided by FTA, modified only if necessary to identify the affected parties.

§16.2.4 ADA Access Requirements. In accordance with Section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112 and Section 504 of the Rehabilitation Act of 1973, as amended, 29 U.S.C. § 794, Contractor agrees that it will comply with the requirements of U.S. Department of Transportation regulations, "Transportation Services for Individuals with Disabilities (ADA)," 49 CFR Part 37; and U.S. Department of Transportation regulations, "Americans with Disabilities (ADA) Accessibility Specifications for Transportation Vehicles," 36 CFR Part 1192 and 49 CFR Part 38, pertaining to facilities and equipment to be used in public transportation. In addition, Contractor agrees to comply with the requirements of 49 U.S.C. § 5301(d) which expresses the Federal policy that the elderly and persons with disabilities have the same right as other persons to use mass transportation services and facilities, and that special efforts shall be made in planning and designing those services and facilities to implement transportation accessibility rights for elderly persons and persons with disabilities. These regulations also provide that no individual, solely by reason of a disability shall be excluded from participation in, or be denied the benefit of, or be subjected to discrimination under any program or activity included in or resulting from this Contract. Contractor also agrees to comply with any implementing requirements FTA may issue.

§16.2.5 Contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.

§16.2.6 Contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, as amended, and by the rules, regulations, and orders of the Secretary of Labor. or pursuant thereto, and shall permit access to his books, records, and accounts by an appropriate agency of the Federal Government and by the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

§16.2.7 In the event of Contractor's noncompliance with the Equal Opportunity conditions of this Contract, Metro shall impose such sanctions as it, or the U.S. Department of Transportation, may determine to be appropriate including, but not limited to withholding of payments to the Contractor under this Contract until Contractor complies, and/or cancellation, termination, or suspension of the Contract, in whole or in part, and Contractor may be declared ineligible for further Government contracts of Federally-assisted contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, as amended, and such other sanctions may be imposed and remedies invoked as provided in said Executive Order, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

§16.2.8 Contractor will include all clauses enumerated in this Article 16 in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, as amended, so that such provisions will be binding upon each Subcontractor or vendor. Contractor will take such action with respect to any Subcontractor or vendor as the appropriate agency of the Federal Government may direct as a means of enforcing such provisions, including sanctions for noncompliance, provided, however, that in the event Contractor becomes involved in, or is threatened with, litigation with a Subcontractor or vendor as a result of such direction by the appropriate agency of the Federal Government, Contractor may request the United States to enter into such litigation to protect the interests of the United States.

§16.2.9 Exemptions to the requirements of the above Equal Opportunity conditions are construction Contracts and Subcontracts not exceeding $10,000, and Contracts and Subcontracts with regard to Work performed outside the United States by employees who were not recruited in the United States.

§ 16.3 Disadvantaged Business Enterprise (DBE).

This Contract is subject to the requirements of Title 49, Code of Federal Regulations, Part 26, Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs. Contractor, sub recipient or Subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Contract. Contractor shall carry out applicable requirements of 49 C.F.R. Part 26 in the award and administration of DOT-assisted contracts. Failure by Contractor to carry out these requirements is a material breach of this Contract, which may result in the termination of this Contract or such other remedy Metro deems appropriate, which may include, but is not limited to: (i) withholding monthly progress payments; (ii) assessing sanctions; (iii) liquidated damages; and/or (iv) disqualifying Contractor from future bidding as non-responsible. Each Subcontractor must include the assurance in this Section. See 49 C.F.R. § 26.13(b).

ARTICLE 17: ADDITIONAL GOVERNMENT REQUIREMENTS

§17.1 FEDERAL CLAUSES FOR PROCUREMENT OF CONTRACTS.

The following clauses are to be integrated with and made a part of the Contract. Whether or not sometimes specified in this Article 17, Contractor shall include each provision in this Article 16 in each subcontract entered into by Contractor in respect of the Work or the Project and shall require each Subcontractor to include all such provisions in any subcontract. Without limitation to the generality of the preceding sentence, Contractor or Subcontractor shall insert in any subcontracts the clauses contained in 29 C.F.R. 5.5(a)(1) through (10), and such other clauses as the Federal Transit Administration may by appropriate instruction require, which will must also be included by subcontractors in any lower tier subcontracts. Whether or not sometimes specified, Contractor shall be responsible for compliance by any Subcontractor or lower tier subcontractor with all the contract clauses in 29 C.F.R. 5.5. Whether or not sometimes so specified, unless expressly other provided in this Contract, all Governmental Requirements of the United States, DOT or the FTA applicable to Metro in respect of the Project, the Work, or the Contract apply to Contract and each Subcontractor in same manner as they apply to Metro and therefore are integrated into and made a part of this Contract as if expressly stated in this Contract. Any term used in this Article 17 that is not defined in the Contract shall be ascribed the meaning as made applicable by the

applicable Governmental Requirement.

§ 17.2 FEDERAL PARTICIPATION NOTIFICATION.
This Contract is a Federal Transit Administration ("**FTA**") grant funded project. Contractor's performance under and in respect of the Contract in compliance with all Governmental Requirements of the FTA, including all applicable FTA regulations, policies, procedures and directives, as any of the same may be amended or promulgated from time to time, including (without limitation) those listed directly or by reference in the current Master Agreement between Metro and the FTA dated as of January 17, 2014, is mandatory. Contractor's failure to so comply constitutes a material breach of the Contract.

§ 17.3 FEDERAL CHANGES/INCORPORATION OF (DOT/FTA) TERMS.
The provisions in this Contract include, in part, certain standard terms and conditions required by FTA, whether or not expressly set forth in the Contract. All contractual provisions required by FTA and any other Governmental Requirement, including those set forth in FTA Circular 4220.1 F, dated November 1, 2008 and all applicable FTA regulations, policies, procedures and directives, as any of the same may be amended or promulgated from time to time are hereby integrated with and made a part of this Contract by reference. Anything to the contrary in this Contract notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in the Contract. Contractor shall not perform any act, fail to perform any act, or refuse to comply with any Metro requests that would cause Metro to be in violation of any Governmental Requirement, including any FTA terms and conditions.

§ 17.4 DISCLAIMER OF FEDERAL GOVERNMENT OBLIGATION OR LIABILITIES.
The Federal Government shall not be subject to any obligations or liabilities to any sub recipient, any third party contractor, or any other party in connection with the performance of this Contract nor to any Person not a party to the related Grant Agreement. Metro and Contractor acknowledge and agree that the Federal Government is not a party to this Contract. Notwithstanding any concurrence by the Federal Government in or approval of this Contract, any solicitation, subagreement, or third party contract in respect thereof, absent the express written consent by the Federal Government, the Federal Government continues to have no obligations or liabilities to any party, including any subrecipient, third party contractor, lessee, or other participant at any tier of the Project or the Contract (whether or not a party to that contract). Contractor agrees to include the immediately preceding sentence in each subcontract financed in whole or in part with Federal assistance provided by FTA, without modification except to identify the Subcontractor who will be subject to its provisions. Each of the terms used in this Section 17.4 that is not defined in any Contract Documents shall be ascribed the meaning as made applicable by the applicable Governmental Requirement.

§ 17.5 NO PROHIBITED INTEREST/CONFLICT OF INTEREST.
§17.5.1 No board member, officer, or employee or agent of the Metro or of a local public body who has participated or will participate in the selection, award, or administration of this Contract, nor any member of his or her immediate family, business partner or any organization which employs, or intends to employ any of the above during such period, shall have any interest, direct or indirect, in this Contract or the proceeds thereof, to any share or part of this Contract, or to any benefit arising therefrom. This shall not be construed to prevent any such person from owning stock in a publicly owned corporation.

§17.5.2 No member of, or delegates to, the Congress of the United States shall be admitted to any share or part of the Contract, or to any benefit arising therefrom. This shall not be construed to prevent any such person from owning stock in a publicly-owned corporation.

§17.5.3 Without limitation to any provision in Section 17.5, Contractor represents to Metro that to the best of Contractor's knowledge after due and diligent investigation and inquiry, there exists no conflict of interest or other prohibited interest (in either case as contemplated by any Governmental Requirement) that exists or will arise or result from, out of, or in connection with the award of the Contract to Contractor or Contractor's execution and performance under and in respect of the Contract.

§17.5.4 Contractor also represents that it has no other activities or relationships that would make the Contractor unable, or potentially unable, to render impartial assistance or advice to Metro in respect of Contractor's performance of the Work or otherwise under or in respect of the Contract or that would impair Contractor's objectivity.

§ 17.6 CONTRACT TERMINATION. DEBARMENT AND SUSPENSION CERTIFICATION.

§ 17.6.1 A breach of the contract clauses in 29 C.F.R. 5.5 may be grounds for termination of the Contract and for debarment as a contractor and a subcontractor as provided in 29 C.F.R. 5.12.

§17.6.2 Contractor shall certify that it is not included in the "U.S. General Services Administration's List of Parties Excluded from Federal Procurement or Non-procurement Programs".

§17.6.3 Contractor agrees to refrain from awarding any subcontract of any amount (at any tier) to a debarred or suspended subcontractor, and to obtain a similar certification from any subcontractor (at any tier) seeking a contract exceeding $25,000.

§17.6.4 Contractor agrees to provide Metro a copy of each conditioned debarment or suspension certification provided by a prospective subcontractor at any tier, and to refrain from awarding a subcontract with any party that has submitted a conditioned debarment or suspension certification until FTA approval is obtained.

§17.6.5 Contractor shall comply and facilitate compliance with DOT regulations, "Nonprocurement Suspension and Debarment," 2 C.F.R. part 1200, which adopts and supplements the U.S. Office of Management and Budget (U.S. OMB) "Guidelines to Agencies on Government wide Debarment and Suspension (Nonprocurement)," 2 C.F.R. part 180. These provisions apply to each contract at any tier of $25,000 or more, and to each contract at any tier for a federally required audit (irrespective of the contract amount), and to each contract at any tier that must be approved by an FTA official irrespective of the contract amount. As such, Contractor shall verify that its principals, affiliates, and subcontractors are eligible to participate in this federally funded contract and are not presently declared by any Federal Governmental Authority department or agency to be:

(a) Debarred from participation in any federally assisted contract;
(b) Suspended from participation in any federally assisted contract;
(c) Proposed for debarment from participation in any federally assisted contract;
(d) Declared ineligible to participate in any federally assisted contract;
(e) Voluntarily excluded from participation in any federally assisted contract; or
(f) Disqualified from participation in any federally assisted contract.

§17.7 SUBSTANCE ABUSE/DRUG ALCOHOL TESTING.

Contractor agrees to comply with U.S. DOT regulation "Drug Free Workplace Requirements (Grant)," 40 CFR, Part 29, Subpart F. In addition, Contractor will comply with all drug, alcohol and substance abuse testing requirements for Metro.

§17.8 COMPLIANCE WITH COPELAND ANTI-KICKBACK ACT AND REGULATIONS.

Contractor and Subcontractors shall comply with the Copeland Regulations of the Secretary of Labor (29 CFR Part 3), which are incorporated into this Contract by this reference. In addition, the Weekly Statement of Compliance required by these regulations shall also contain a statement that the fringe benefits paid are equal to or greater than those set forth in the minimum wage decision. The FTA requires that all construction or repair contracts include provisions that the Contractor comply with the Copeland Anti-Kickback Act which prohibits Contractor from inducing any person employed on the project to give up any portion of their pay. Further, the provision requires Metro to report all suspected or reported violations to FTA.

§17.9 LABOR STANDARDS PROVISIONS APPLICABLE TO CONTRACTS GOVERNING FEDERALLY FINANCED AND ASSISTED CONSTRUCTION; DAVIS-BACON MATTERS.

Contractor agrees to comply and assures compliance with the requirements of 40 USC Sections 3141-3144 and 3146-3148 and all related Governmental Requirements, and the "Labor Standards Provisions Applicable to Contracts Governing Federally Financed and Assisted Construction" (29 C.F.R. Part 5). In order to ensure compliance with the Act, the Contract requires Metro to monitor Contractor and its Subcontractors with respect to payment of "Davis-Bacon" wages by performing the following:

§17.9.1 Requiring Contractor to submit weekly a copy of all payrolls to Grant Administrator. The copy is to be accompanied by a statement signed by Contractor indicating that the payrolls are correct and complete, and that the wage rates contained therein are not less than those determined by the Secretary of Labor.

§17.9.2 Upon completion of the Contract, Contractor is required to submit to the Grant Administrator, a certificate concerning wages and classifications for laborers and mechanics, in a prescribed form as contained in the Contract.

§17.9.3 Contractor shall comply with all rulings and interpretations of the Davis-Bacon Act, 49 U.S.C. §5333(a), (Act of March 3, 1931,46 Stat. 1491, as amended; codified at 40 U.S.C. § 276a et seq.) and Related Acts and implementing regulations contained in 29 C.F.R. Parts I, 3 and 5, and all related Laws are incorporated into this Contract by reference. Without limitation to any other provision of the Contract, Contractor agrees comply with each of the same. In general the Act requires that all laborers and mechanics employed by Contractor or Subcontractors performing Work to be paid wages not less than those wages established for the locality of the project by the Secretary of Labor.

§17.9.4 Contractor shall comply with the requirements of 49 C.F.R. Part 3, which are incorporated by reference into this Contract.

§17.9.5 Contractor agrees to pay wages to laborers and mechanics performing contract work at a rate not less than the minimum wages specified in a wage determination issued by the U.S. Secretary of Labor and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 C.F.R. Part 3)). Contractor agrees to place a copy of the current prevailing wage determination issued by the U.S. Department of Labor (DOL) in each solicitation for Subcontractor Work under this Contract, and agrees to refrain from awarding any affected contracts until the subcontractor agrees to the required wage determination.

§17.9.6 Metro shall upon its own action or upon written request of an authorized representative of the U.S. Department of Labor withhold or cause to be withheld from Contractor under this Contract or any other Federal contract with the same prime contractor, or any other federally assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by Contractor or any Subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the Contract project), all or part of the wages required by the Contract, Metro may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

§17.9.7 Payrolls and basic records relating thereto shall be maintained by Contractor during the course of the Work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the Work. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under Section 5.5(a) (3) (i) of the Regulations, 29 C.F.R. Part 5. Contractor is responsible for the submission of copies of payrolls by all Subcontractors.

§17.9.8 Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

§17.9.8.1 Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen in any craft classification shall not be greater than the ratio permitted to the Contractor as to his entire work force under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not a trainee as defined in Section 17.9.8.2 or is not registered or otherwise employed as stated above, shall be paid the wage rate determined by the Secretary of Labor for the classification of work he actually performed. Contractor will be required to furnish the Owner or a representative of the U.S. Department of Labor written evidence of the registration of his program and apprentices, as well as the appropriate ratios and wage rates (expressed in percentages of the journeyman hourly rates), for the area of construction prior to using any

apprentices shall not be less than the appropriate percentage of the journeyman's rate contained in the applicable wage determination.

§17.9.8.2 Trainees. Except as provided in 29 C.F.R. 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Any employee listed in the payroll at a trainee rate that is not registered and participating in a training plan approved by the Bureau of Apprenticeship and Training shall be paid not less than the wage rate determined by the Secretary of Labor for the classification of work he actually performed. Contractor will be required to furnish to the Metro or a representative of the U.S. Department of Labor written evidence of the certification of his program. In the event the Bureau of Apprenticeship and Training withdraws approval of a training program, Contractor will no longer be permitted to utilize trainees less than the applicable predetermined rate for the work performed until an acceptable program is approved.

§17.9.8.3 Conformity with Applicable Governmental Requirements. The utilization of apprentices, trainees, and journeymen under this part shall be in conformity with the Equal Employment Opportunity requirements of Executive Order No. 11246, as amended, and 29 CFR Part 30.

§17.9.8.4 Related Directive from Metro. Contractor acknowledges each of the above requirements and agrees to comply therewith and any directive by Metro pursuant to or in furtherance of each of the foregoing.

§17.9.8.5 Payroll Records Submissions. Contractor must submit a copy of all payrolls each week to the Grant Administrator. The copy is accompanied by a statement signed by the Contractor indicating that the payrolls are correct and complete, and that the wage rates contained therein are not less than those determined by the Secretary of Labor. Upon completion of the contract, the Contractor is to submit to the Grant Administrator, a certificate concerning wages and classifications for laborers and mechanics in a prescribed form as contained in the Contract.

§17.9.8.6 Subcontracts. Contractor and each Subcontractor shall insert in any subcontracts the clauses contained in 29 C.F.R. 5.5(a)(1) through (10) and such other clauses as the Federal Transit Administration may by appropriate instruction require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime Contractor shall be responsible for the compliance by any Subcontractor or lower tier subcontractor with all the contract clauses in 29 C.F.R. 5.5.

§17.9.8.7 Breach; Contract Termination; Debarment. A breach of the contract clauses in 29 C.F.R. 5.5 may be grounds for termination of this Contract, and for debarment as a contractor and subcontractor as provided in 29 C.F.R. 5.12.

§17.9.8.8 Disputes Concerning Labor Standards. Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general disputes clause of this Contract. Such disputes shall be resolved in accordance with the procedures of the U.S. Department of Labor set forth in 29 C.F.R. parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

§17.9.8.9 Certification of Eligibility.

§17.9.8.9.1 By entering into this Contract, Contractor certifies that neither it (nor he or she as applicable) nor any person or firm who has an interest in Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis Bacon Act or 29 C.F.R. 5.12(a)(l).

§17.9.8.9.2 No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act of 29 C.F.R. 5.12(a)(l).

§17.9.8.9.3 The penalty for making false statements is prescribed in the U.S. Criminal Code, 18, U.S.C. 1001.

§17.10 AIR POLLUTION/CLEAN AIR.

All facilities and equipment acquired, constructed, reconstructed, improved or utilized by Contractor in the performance of this Contract shall be designed and equipped to prevent or control air pollution in compliance with all applicable standards, orders, or regulations issued pursuant to the Clean Air Act 42 U.S.C. 7401 et seq., 40 CFR 15.61, 49 CFR Part 18. If state or local air pollution regulations are in force, the more restrictive criteria shall govern. Contractor and any suppliers must submit evidence to Metro that the governing air pollution criteria will be met. Contractor agrees to report, and to require each Subcontractor receiving more than $100,000 from the Contract to report, any violation of these requirements resulting from any project implementation activity to Metro. Contractor acknowledges that Metro will, in turn, report each violation as required to FTA and the appropriate Regional office of the Environmental Protection Agency. Contractor shall require each subcontract in respect of the Work exceeding $100,000 to include this provision.

§17.11 BUY AMERICA.

To the extent applicable to the Work, Contractor agrees to comply with 49 U.S.C.§ 5323(j), and FTA's Buy America regulations at 49 C.F. R. Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in this Project are produced in the United States, unless a waiver of these provisions is granted. General waivers are listed in 49 C.F.R. 661.7. Rolling stock must be assembled in the United States and have a 60 percent domestic content. Separate requirements for rolling stock are set out in 49 U.S.C. 5323(j) (l) and 49 C.F.R. Part 611.11.

§17.12 CLEAN AIR REQUIREMENTS.

Contractor shall comply with all applicable standards, orders, or regulations issued pursuant to the Clean Air Act, as amended, 42, U.S.C. § 7401 et seq. Contractor agrees to report, and to require each subcontractor receiving more than $100,000 from this Contract to report, any violation of these requirements resulting from any Project or Contract implementation activity to Metro. Contractor understands that Metro will, in turn, report each violation as required to assure notification to the FTA and the appropriate U.S. EPA Regional Office will be notified. Contractor shall require each subcontract in respect of the Work exceeding $100,000 to include this provision.

§17.13 CARGO PREFERENCE.

In the event that ocean shipment is required for any material or commodity pursuant to the Contract, the Contractor agrees to utilize United States-Flag commercial vessels to ship at least fifty percent (50%) of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, to the extent such vessels are available at fair and reasonable rates for the United States-Flag commercial vessels. Contractor further agrees to furnish within 20 working days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated "ON BOARD" commercial ocean bill-of-lading in English for each shipment of cargo described in the paragraph above to Metro (through the Contractor or in the case of subcontractor bill-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, 400 Seventh Street, S.W., Washington, DC, 20590, marked with the appropriate identification of the Project.

Contractor agrees to include these requirements in all subcontracts issued pursuant to this Contract when the subcontract may involve the transport of equipment, material, or commodities by ocean vessel.

§17.14 CLEAN WATER REQUIREMENTS.

Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq. Contractor agrees to report and require each subcontractor receiving more than $100,000 from this Contract to report any violation of these requirements resulting from any Project or Contract implementation activity to Metro. Contractor acknowledges that Metro will, in turn, report each violation as required to FTA and the appropriate Regional office of the Environmental Protection Agency. Contractor shall require each subcontract in respect of the Work exceeding $100,000 to include this provision.

§17.15 RECYCLED PRODUCTS/RECOVERED MATERIALS.

Contractor agrees to comply with all the requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 U.S.C. 6962), including but not limited to the regulatory provisions of 40 C.F.R. Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 C.F.R. Part 247. To the extent practicable and economically feasible, the Contractor agrees to provide a competitive preference for "green" or other products and services that conserve natural resources and protect the environment and are energy efficient. Examples of such products may include, but are not limited to products described in U.S.

Environmental Protection Agency (EPA) guidelines at 40 C.F.R. Parts 24-253, which implement Section 6002 of RCRA. Contractor will also include these requirements in each subcontract exceeding $100,000.00 that is funded in whole or in part with any FTA assistance.

§17.16 SEAT BELT USE.
In compliance with Federal Executive Order No. 13043, 23 U.S.C. Section 402 note, FTA encourages Contractor to adopt and promote on-the-job seat belt use policies and programs for its employees and other personnel that operate company owned, rented, or personally operated vehicles, and to include this provision in any third party subcontracts, involving the Work or the Project.

§17.17 CONTRACT WORK HOURS AND SAFETY STANDARDS ACT (40 U.S.C. SECTIONS 3701 THROUGH 3708).
§17.17.1 Overtime Requirements. No Contractor or Subcontractor contracting for any part of the Work under this Contract that may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such Work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

§17.17.2 Violation; Liability for Unpaid Wages; Liquidated Damages. In the event of any violation of the clause set forth in Section 17.17.1, Contractor and any Subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and Subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in Section 17.17.1, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in Section 17.17.1.

§17.17.3 Withholding for Unpaid Wages and Liquidated Damages. Metro shall upon its own action or upon written request of an authorized representative of the U.S. Department of Labor withhold or cause to be withheld. from any moneys payable on account of Work performed by Contractor or Subcontractor under any the Contract or any other Federal contract with the same prime Contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or Subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in Section 17.17.2.

§17.17.4 Safety Standards. No Contractor or Subcontractor contracting for any part of the Work that may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic to work in surroundings or under conditions that are unsanitary, hazardous, or dangerous as prohibited by the safety requirements of Section 107 of the Contract Work Hours and Safety Standards Act, 40 U.S.C. § 3704, and its implementing U.S. Department of Labor regulations, "Safety and Health Regulations for Construction," 29 CFR Part 1926, 36 CFR 7340, April 17, 1971, pursuant to Section 107 of the Contract Work Hours and Safety Standards Act.

§17.17.5 Subcontracts. Contractor and Subcontractor shall insert in any subcontracts the clauses set forth in Sections 17.17.1 through 17.17.5 and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. Contractor shall be responsible for compliance by any Subcontractor or lower tier subcontractor with the clauses set forth in this Section 17.17.

§17.18 ENERGY CONSERVATION.
Contractor agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in the State of Nebraska Energy Conservation Plan, if any, issued in compliance with the energy Policy and Conservation.

§17.19 ACCESS TO RECORDS; RETENTION OF RECORDS
§17.19.1 Record Retention. Contractor will retain, and will require all Subcontractors of all tiers to retain, complete and readily accessible records related in whole or in part to the Contract, including, but not limited to, data, documents, reports, statistics, sub-agreements, leases, subcontracts, arrangements, other third party agreements of any type, and supporting materials related to those records.

§17.19.2 Retention Period. Contractor agrees to comply with the record retention requirements in accordance with 2

C.F.R. §200.333. Contractor shall maintain all books, records, accounts and reports required under this Contract for a period of at not less than three (3) years after the date of termination or expiration of this Contract, except in the event of litigation or settlement of claims arising from the performance of this Contract, in which case records shall be maintained until the disposition of all such litigation, appeals, claims or exceptions related thereto.

§17.19.3.Access to Records. Contractor agrees to provide sufficient access to Metro, FTA, the Secretary of Transportation, the Comptroller General of the United States, and its contractors to inspect all work, materials, construction sites, payrolls, and other data and records, and to audit records and information related to performance of this Contract as reasonably may be required. Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

§17.19.4 Access to the Sites of Performance. Contractor agrees to permit FTA and its contractors access to the sites of performance under this Contract as reasonably may be required.

§17.19.5 Subcontract Requirements. Contractor agrees to include each of the clauses § 17.16.5 through § 17.16.5 in each subcontract that is financed in whole or in part with assistance provided by FTA, which paragraphs shall not be modified, except to identify the Subcontractor who will be subject to its provisions.

§17.20 FLY AMERICA.

If applicable, Contractor agrees to comply with 49 U.S.C. 40118 (the "Fly America" Act) in accordance with the General Service Administration's regulations at 41 C.F.R. Part 301-10, which provide that recipients and sub recipients of Federal funds and their Contractors are required to use U.S. Flag air carriers for U.S. Government-financed international air travel and transportation of their personal effects or property, to the extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. Contractor shall submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service by a U.S. flag air carrier was not available or why it was necessary to use a foreign air carrier and shall, in any event, provide a certificate of compliance with the Fly America requirements. Contractor agrees to include the requirements of this paragraph in all subcontracts that may involve international air transportation.

§17.21 LOBBYING RESTRICTIONS.

§17.21.1 Pursuant to Public Laws I 0 I -121 and 104-65, Contractor hereby certifies that to the best of Contractor's knowledge and belief, that no Federal funds were used to influence or attempt to influence an officer or employee of any Federal department or agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress regarding obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352.

§17.21.2 Contractors who use non-Federal funds for lobbying on behalf of specific projects or proposals must submit disclosure documentation when these efforts are intended to influence the decisions of Federal officials. If applicable, Standard Form-LLL "Disclosure Form to Report Lobbying" is required with Contractor's first submission initiating Metro's consideration for the Contract. Additionally, disclosure forms are required each calendar quarter following the first disclosure if there has been a material change in the status of the previous disclosure. A material change includes: 1) a cumulative increase of $25,000 or more in the amount paid or expected to be paid for influencing or attempting to influence a covered Federal action; 2) a change in the person(s) or individual(s) influencing or attempting to influence a covered Federal action; or 3) a change in the officer(s) or employee(s) or member(s) contacted to influence or attempt to influence a covered Federal action.

§17.21.3 Contractor is required to obtain the same certification and disclosure from all Subcontractors (at all tiers) when the Federal money involved in the subcontract is $100,000 or more. Any such disclosure forms received by the Contractor must be forwarded to Metro.

§17.22 SEISMIC SAFETY.

Contractor agrees that any new building or addition to an existing building, which is a part of the Work or the Project, will be designed and constructed in accordance with the standards for Seismic Safety, required in the Department of Transportation Seismic Safety Regulations 49 C.F.R. Part 41 and will certify to compliance to the extent required by the regulation. Contractor also agrees to ensure that all applicable Work performed under this Contract including work performed by a Subcontractor is in compliance with the standards required by the Seismic Safety Regulations and the certification of compliance issued on the Work and the Project.

§17.23 NATIONAL INTELLIGENT TRANSPORTATION SYSTEMS ARCHITECTURE AND STANDARDS.

To the extent applicable to the Work or the Contract, Contractor agrees to conform, to the extent applicable, to the National Intelligent Transportation Systems (ITS) Architecture and Standards as required by SAFETEA-LU § 5307(c), 23 U.S.C. § 512 note, and comply with FTA Notice, "FTA National ITS Architecture Policy on Transit Projects" 66 Fed. Reg. 1455 et seq., January 8, 2001, and any subsequent further implementing directives, except to the extent FTA determines otherwise in writing.

§17.24 PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS OR RELATED ACTS.

§17.24.1 Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. § § 3801 et seq. and DOT regulations, "Program Fraud Civil Remedies," 49 C.F.R. Part 31, apply to its actions pertaining to the Contract and the Project. By execution of the Contract, Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the Contract or the FTA assisted Project for which the Contract and the Work is being performed. In addition to other penalties that may be applicable, Contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on Contractor to the extent the Federal Government deems appropriate.

§17.24.2 Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to Metro or the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by FTA to Metro under 49 U.S.C. § 5307, the Federal Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307(n)(1) on Contractor, to the extent the Federal Government deems appropriate.

§17.24.3 Contractor agrees to include the above two paragraphs in each subcontract that is financed in whole or in part with assistance provided by FTA, which paragraphs shall not be modified, except to identify the Subcontractor who will be subject to its provisions.

§ 17.25 RESOLUTION OF DISPUTES, BREACHES, OR OTHER LITIGATION; FTA INTEREST; NOTIFICATION TO FTA.

Contractor acknowledges that FTA has a vested interest in the settlement of any violation of federal law, regulation, or requirement, or any disagreement involving the award of the Contract, the Contract and any amendments thereto, and Contractor's performance under and in respect of the Contract, including, but not limited to, a default, breach, major dispute, or litigation, and that FTA reserves the right to concur in any settlement or compromise in respect of any such matter. If there shall occur any matter that may affect the interest of the Federal Government, including without limitation FTA or DOT, Metro must promptly notify the FTA Chief Counsel, or FTA Regional Counsel for the Region in which Metro is located. For information purposes only and without limitation to the generality of this Section: the types of legal matters that require notification include, but are not limited to a major dispute, breach, default, litigation, or naming the Federal Government as a party either to litigation or a legal disagreement in any forum for any reason; and matters that may affect the Federal Government include, but are not limited to: the Federal Government's interests involving the award of the Contract or the Federal Government's administration or enforcement of federal laws, regulations, and requirements in respect of the Contract. If Metro has credible evidence that in respect of the Contract a Principal, Official, Employee, Agent, or Third Party Participant of Metro (including Contractor) or other person has submitted a false claim under the False Claims Act, 31 U.S.C. § 3729 et seq., or has committed a criminal or civil violation of law pertaining to such matters as fraud, conflict of interest, bribery, gratuity, or similar misconduct involving federal assistance, Metro must promptly notify the DOT Inspector General, in addition to the FTA Chief Counsel or Regional Counsel for the Region in which the Metro is located.

§17.26 VETERANS PREFERENCE.

The Contract is a capital project funded using FTA funding assistance. For that reason, Contractor shall give a hiring preference, to the extent practicable, to veterans (as defined in Section 2108 of Title 5) who have the requisite skills and abilities to perform the construction Work required under the Contract. This Section shall not be understood, construed or enforced in any manner that would require an employer to give a preference to any veteran over any equally qualified applicant who is a member of any racial or ethnic minority, female, an individual with a disability, or a former employee.

§17.27 SPECIAL PROVISION – TEXT MESSAGING WHILE DRIVING.

§17.27.1 In accordance with Executive Order No. 13513,Federal Leadership on Reducing Text Messaging While Driving, October 1, 2009, 23 U.S.C.A. § 402 note, and DOT Order 3902.10, Text Messaging While Driving December 30, 2009, Metro has agreed to comply (1) Executive Order No. 13513, "Federal Leadership on Reducing

Text Messaging While Driving," October 1, 2009, 23 U.S.C. § 402 note, (74 Fed. Reg. 51225), (2) U.S. DOT Order 3902.10, "Text Messaging While Driving," December 30, 2009, and (3) The following U.S. DOT Special Provision pertaining to Distracted Driving:

§17.27.2 Safety. Metro agrees to adopt and enforce workplace safety policies to decrease crashes caused by distracted drivers, including policies to ban text messaging while using an electronic device supplied by an employer, and driving a vehicle the driver owns or rents, a vehicle Metro owns, leases, or rents, or a privately-owned vehicle when on official business in connection with the Contract, or when performing any work for or on behalf of the Contract;

§17.27.3 Metro Size. Metro agrees to conduct workplace safety initiatives in a manner commensurate with its size, such as establishing new rules and programs to prohibit text messaging while driving, re-evaluating the existing programs to prohibit text messaging while driving, and providing education, awareness, and other outreach to employees about the safety risks associated with texting while driving, and

§17.27.4 Extension of Provision. Metro agrees to include the preceding Special Provision of Sections 34.b(3)(a) – (b) of the Master Agreement in its third party agreements, and encourage its Third Party Participants to comply with this Special Provision, and include this Special Provision in each third party subagreement at each tier supported with federal assistance.

§17.27.5 Subcontracts. Metro hereby encourages Contractor to comply with the Special Provision. Contract agrees to include this requirement in each subcontract and to encourage Subcontractor's compliance with the Special Provision.

§17.28 NEW EMPLOYEE WORK ELIGIBILITY STATUS.

Contractor is required and hereby agrees to use a federal immigration verification system to determine the work eligibility status of new employees physically performing services within the State of Nebraska. A federal immigration verification system means the electronic verification of the work authorization program authorized by the Illegal Immigration Reform and Immigrant Responsibility Act of 1996, 8 U.S.C. 1324a, known as the E-Verify Program, or an equivalent federal program designated by the United States Department of Homeland Security or other federal agency authorized to verify the work eligibility status of a newly hired employee. If the Contractor is an individual or sole proprietorship, the following applies:

§17.28.1 Contractor must complete the United States Citizenship Attestation Form, available on the Department of Administrative Services website at www.das.state.ne.us.

§17.28.2 If Contractor indicates on such attestation form that he or she is a qualified alien, the Contractor agrees to provide the US Citizenship and Immigration Services documentation required to verify the Contractor's lawful presence in the United States using the Systematic Alien Verification for Entitlements (SAVE) Program.

§17.28.3 Contractor understands and agrees that lawful presence in the United States is required and Contractor may be disqualified or the Contract terminated if such lawful presence cannot be verified as required by Neb. Rev. Stat. §4-108.

§17.29 MISCELLANEOUS LABOR PROVISIONS

§17.29.1 Final Labor Summary. Contractor and each Subcontractor shall furnish to Metro, upon the completion of the Contract, a summary of all employment, indicating, for the completed Work, the total hours worked and the total amount earned.

§17.29.2 Final Certificate. Upon completion of the Contract, Contractor shall submit to Metro with the voucher for final payment for any Work performed under the Contract, a certificate concerning wages including apprentices and trainees, employed on the Project, in the following form:

"The undersigned Contractor on _____ Contract No.) hereby certifies that all laborers, mechanics, apprentices, and trainees employed by him or by a Subcontractor performing work under this Contract on the project have been paid wages at rates not less than those required by the contract provisions, and that the work performed by each such laborer, mechanic, apprentice, or trainee conformed to the classifications set forth in the Contract or training program provisions applicable to the wage rage paid."

Signature and Title:

§ 17.30 MINIMUM WAGES.

(i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in §5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided* that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a) (1) (ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

ARTICLE 18 MISCELLANEOUS PROVISIONS

§ 18.1 GOVERNING LAW/VENUE

The Contract and all rights of the parties thereunder shall be construed, enforced, and governed by the internal laws of the State of Nebraska (without regard to its choice of law principles), except as otherwise expressly mandated by any Governmental Requirement. Except as may otherwise expressly mandated by any Governmental Requirement, the parties agree that any action, suit, claim or proceeding arising out of, or and any disputes, issues, or other matters directly or indirectly related to, the Contract and any rights, remedies, obligations, or duties thereunder, or the performance or enforcement hereof or thereof, shall be brought solely and exclusively in the state or federal courts of the State sitting in Omaha, Douglas County, Nebraska. Each party irrevocably consents and unconditionally waives any objection to the sole and exclusive jurisdiction and venue of such courts as to any such matter and hereby further irrevocably and unconditionally waives and agrees not to plead or claim in any such court that any such action, suit or proceeding brought in any such court has been brought in an inconvenient forum.

§18.2 BINDING EFFECT.

The Contract shall bind and inure to the benefit of the successors and permitted assigns of the parties.

§18.3 INTENTIONALLY DELETED

§18.4 ASSIGNMENT.

Contractor shall not assign the Contract nor otherwise transfer (whether by assignment, operation of law, novation or otherwise) any right, obligation or interest therein of Contractor therein without the prior written consent of Metro, as determined in its sole judgment and absolute discretion, and any attempt to do so shall be void and without any force or effect. If Metro elects to consent to any such assignment or transfer, all covenants, terms, provisions and conditions of the Contract shall be binding upon and inure to the benefit of the such assignee and transferee; provided however that neither Contractor nor any surety of Contractor shall be relieved from past, future contingent or other any obligation, liability or responsibility under or in respect of the Contract or except as may be expressly agreed to in writing by Metro when consenting to such assignment or transfer.

§18.5 COUNTERPARTS. The Agreement (and any other Contract Document that may require a signature) may be executed at different times and in two or more counterparts and all counterparts so executed shall for all purposes constitute one agreement, binding on the parties, notwithstanding that all parties shall not have executed the same

counterpart. The exchange of signed copies of the Agreement or any other Contract Document and signature pages by email or facsimile transmission shall constitute effective execution and delivery of the Contract as to the parties and may be used in lieu of the original of thereof for all purposes. Signatures of the Parties transmitted by email or facsimile shall be deemed to be the original signatures for all purposes.

§18.6 CAPTIONS.

Captions and titles contained in all Contract Documents are for convenience and identification purposes only. Section captions or titles are not intended to be restrictive and in no way indicate all requirements pertaining to the caption subject are confined to that section. Likewise, requirements and regulations contained in a section may apply to or supplement other contract requirements or sections. No caption shall be deemed to constitute part of the Contract or to affect the construction thereof

§18.7 SURVIVAL.

Without limitation to or prejudice to any other provision in these General Conditions or any other Contract Document, the indemnification obligations, covenants, representations, and warranties made in respect of the Contract shall survive the expiration and termination of the Contract. In addition to any provisions expressly stated to survive expiration or termination of the Contract, all provisions which by their terms provide for or contemplate obligations or duties of a party to extend beyond such expiration or termination (and the corresponding rights of the other party to enforce or receive the benefit thereof) shall survive the expiration or termination of the Contract. This Section 18.7 shall survive the expiration and termination of the Contract

§18.7 THIRD PARTY BENEFICIARIES.

No Person shall be a third-party beneficiary of the representations, warranties, covenants, and agreements made by any party.

§18.8 NOTICES

Any notice required or otherwise provided under or relating to the Contract shall be valid unless given in writing and shall be deemed sufficiently given and served for all purposes only if and when personally delivered, delivered by recognized next day carrier, or three (3) business days after a writing is deposited in the United States mail, first class postage or other charges prepaid and registered or certified, return receipt requested, addressed as follows:

If to Metro:

2222 Cuming Street
Omaha, NE 68102
Attention: Jeff Rumery

with a copy to:
AECOM
564 White Pond Drive
Akron, Ohio 44320,
Attention: Bill Crowley

If to Contractor:
_____
_____
_____
Attention: _____

with a copy to:
Metro
2222 Cuming Street
Omaha, NE 68102
Attention: Jeff Rumery

If to Architect:
AECOM
564 White Pond Drive
Akron, Ohio 44320,
Attention: Bill Crowley

with a copy to:
Metro
2222 Cuming Street
Omaha, NE 68102
Attention: Jeff Rumery

§18.9 RELATIONSHIP OF PARTIES.
The relationship established between the parties for the Contract is that of independent contractors, and nothing contained in any Contract Document shall be deemed to establish or otherwise create between them a relationship of principal and agent, joint venture, partnership or other relationship other than that as independent contractor. Except as otherwise expressly allowed by the Contract Documents, neither party and none of the agents, employees, representatives or independent contractors of a party will (i) be considered an agent, employee or representative of the other party for any purpose whatsoever; (ii) have any authority to make any agreement or commitment for the other party or to incur any liability or to assume or create any obligations of any kind, whether express or implied, in the other party's name on behalf of the other party nor incur any liability or obligation on its behalf; or (iii) represent to third parties that any of them has any right so to bind the other party. In no event shall Metro or any Metro Indemnified Party be liable for any claims, losses, damages, or liabilities of any kind resulting from any action taken or failed to be taken by the Contractor.

§18.9.1 Drafting Party. Notwithstanding the fact that these General Conditions or any other Contract Document may have been prepared by counsel for one of the parties, each party confirms that it and its respective counsel have reviewed, negotiated and adopted the Contract as the joint agreement and understanding of the parties, and the Contract is to be construed as a whole and any presumption that ambiguities are to be resolved against the primary drafting party shall not apply. Each party agrees that it has fully participated in the preparation and negotiation of the Contract, and each party disclaims any claim, defense or assertion in any litigation, arbitration or other proceeding that any ambiguity herein shall be construed against the drafting party.

§ 18.10 SEVERABILITY.
If any provision of these General Conditions or any other Contract document is held to be illegal, invalid, or unenforceable under present or future laws, such provision shall be fully severable to the extent permitted by Law and this Agreement then shall be construed and enforced as if such illegal, invalid, or unenforceable provision had never comprised a part of the Contract, and the remaining provisions of the Contract shall remain in full force and effect and shall not be affected by the illegal, invalid, or unenforceable provision or by its severance from the Contract.

§18.11 METRO CONSENT/APPROVAL.
The parties shall execute and deliver such additional instruments and documents as may be reasonably requested by any of them in order to carry out the purposes and intent of the Contract. Each party agrees to take such further actions and to execute such additional documents or instruments as may be reasonably requested by the other party to carry out the purpose and intent of this Agreement. Except where expressly otherwise stated, whenever any consent or approval by Metro is required under any Contract Document, (and whether or not sometimes so specified in any Contract Document), such consent or approval may be withheld by Metro as determined by Metro in its sole judgment and absolute discretion.

§18.12 AUTHORITY OF SIGNATORIES.
Each party represents to the other party that the Agreement and the Contract have been duly authorized executed and delivered by such party and upon request will furnish satisfactory evidence thereof.

§18.13 INTERPRETATION.

Unless otherwise specified in any Contract Document, whenever used in these General conditions or in any other Contract Document, (a) the singular includes the plural and the plural the singular; (b) words importing any gender include the other genders; and (c) references to persons or parties include their permitted successors and assigns. The parties recognize and agree that many of the Governmental Requirements, including Regulatory Approvals governing the Contractor's performance of the work and its other obligations, responsibilities under or in respect of the Contract are subject to updating, amendment or replacement. Therefore, all such references to any such matters (whether or not sometimes so specified in these General Conditions or any other Contract Document) are agreed by the parties to be deemed to refer to the then current updated, amended or replacement form of such Governmental Requirements that may be effective at any applicable to the Contract and the same are hereby incorporated into the Contract by this reference.

§18.14 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the applicable law

DIVISION 7-

TECHNICAL SPECIFICATIONS

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TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

1. 2017 State of Nebraska Standard Specifications for Highway Construction and Standard Plans
2. City of Omaha's Standard Specifications for Public Works Construction, 2014 edition
3. Technical Specifications:

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Statement of Special Inspections

Project Title: *OBRT* Project Address: *Varies*

Permit Number: General Contractor:

Owner: *Metro* Owner's Address:

Registered Design Professional in Responsible Charge – Structural: *Abby Goranson*

Registered Design Professional in Responsible Charge – Civil:

Testing and Special Inspections will be performed in accordance with the approved drawings and specifications, this statement, and the governing Building Code. The Special Inspection and Testing Services do not supersede or replace the inspections performed by the Authority Having Jurisdiction (AHJ) nor other Observations required by the Building Code. Contactor shall coordinate work to be performed with the AHJ and the Special Inspector and Testing Agencies. This *Statement of Special Inspections* is submitted as a condition for permit issuance in accordance with the Special Inspection and Structural Testing requirements of the Building Code. It includes a Schedule of Special Inspection services applicable to this project, as well as the required qualifications of the associated Special Inspectors and Testing personnel for conducting these inspections and tests. This *Statement of Special Inspections* encompass the following discipline(s) (indicated by an "X"):

☒ Structural ☒ Civil ☐ Mechanical/Electrical/Plumbing

☐ Architectural ☐ Fire Protection ☐ Other: _____

The Primary Special Inspection Agency (or firm) shall appoint a Special Inspection Project Manager (footnote "a" in the Schedule of Special Inspection and Testing Agencies), who shall keep records of all inspections and shall furnish inspection reports (at frequency indicated below) to the City of Omaha , Contractor and the Architect* (*who shall distribute reports to the appropriate Registered Design Professional(s) in Responsible Charge [RDP(s)]). Reports shall include, at a minimum, 1) product inspected or tested, 2) the inspection performed, 3) the name of the inspector or testing technician and the applicable time period, and 4) whether work inspected was or was not completed in conformance to *approved construction documents*. The level of detail recorded should result in confidence that the product is in compliance with the requirements. Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If not corrected within 24 hours of notification to the Contractor, the discrepancies shall also be brought to the attention of the City of Omaha , Owner, and the Architect* in the form of a separate non-compliance report. Planned or taken corrective action shall be indicated. The Special Inspection program does not relieve the Contractor of his or her responsibilities. Interim reports shall be submitted to the City of Omaha , Contractor, and Architect*.

Interim Report Frequency: *Bi-weekly* or ☐ per attached schedule.

IN CONSIDERATION OF RECEIVING AND/OR USING THIS STATEMENT OF SPECIAL INSPECTION FOR ANY REASON, THE RECIPIENT AND/OR ANY USER OF THIS STATEMENT OF SPECIAL INSPECTION AGREES WITH THE FOLLOWING: (1) THIS STATEMENT OF SPECIAL INSPECTION IS FOR INFORMATIONAL PURPOSES ONLY; (2) NOTHING HEREUNDER SHALL AMEND, REVISE OR OTHERWISE CREATE ANY OBLIGATIONS, LIABILITY AND/OR RESPONSIBILITIES FOR THE RDP(s) AND/OR THE RDP(s) RESPECTIVE FIRMS OUTSIDE THE OBLIGATIONS, LIABILITIES, AND/OR RESPONSIBILITIES PROVIDED FOR UNDER THEIR RESPECTIVE AGREEMENT(S) THAT ARE RELATED TO THE PROJECT; (3) FOR THE PURPOSE OF CLARITY AND WITHOUT LIMITING THE FOREGOING, THE RDP(s) SHALL NOT HAVE CONTROL OVER, CHARGE OF, OR BE RESPONSIBLE, IN ANY WAY, FOR THE MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES, OR FOR ANY HEALTH OR SAFETY PROGRAMS IN CONNECTION WITH ANY CONSTRUCTION WORK ARISING FROM THE PROJECT;(4) APPROVAL AS A RESULT OF INSPECTION SHALL NOT BE CONSTRUED TO BE AN APPROVAL OF A VIOLATION OF THE PROVISIONS OF THE APPLICABLE BUILDING CODES, LAWS OR REGULATIONS. A *Final Report of Testing and Special Inspections* documenting completion of all required Testing and Special Inspections, and correction of any discrepancies noted in the testing and/or special inspections shall be submitted to the City of Omaha , Owner, and the Architect* prior to issuance of a Certificate of Use and Occupancy.

A preconstruction meeting shall be held to discuss responsibilities, scheduling, and other items required to review the Special Inspections and Testing are appropriately carried out. Job site safety and means and methods of construction are solely the responsibility of the Contractor.

Prepared by:

(type or print name)

Signature Date

Design Professional Seal

Prepared by:

(type or print name)

Signature Date

Design Professional Seal

Definitions for This Statement of Special Inspections

Various building codes, referenced standards, supplemental references, and other entities use varying definitions of terms contained herein. Therefore, the definitions provided below represent the intention of the author(s) of this statement to be applied for the Testing Special Inspections contained herein. See the governing Building Code for definitions not contained herein.

Approved: Acceptable to the City of Omaha or the Authority Having Jurisdiction.

Construction Documents: The documents consisting of the original and revised Contract Documents (Project Drawings and Specifications), as well as any supplemental documents that aid the Special Inspector to verify compliance with the design intent (e.g., Contractor's Work Plan). The International Building Code restricts the definition of "Construction Documents" to only those documents needed for permit application, but such restriction is not intended herein. Conversely, some referenced standards, such as the American Institute of Steel Construction, exclude the Contract Documents from the definition of "Construction Documents", which again, is not intended herein.

Special Inspection: Inspection of construction requiring the expertise of an approved special inspector (or inspectors) for the purpose of observing general compliance with the Building Code, this statement, and the approved construction documents.

Special Inspections-Continuous: Special inspection by the special inspector who is present when and where the work to be inspected is being performed. This is not intended to necessarily mean that when multiple workers are performing the same type of work requiring continuous special inspection simultaneously, that each worker requires a unique special inspector to be present the entire time the work is being performed (i.e., the Special Inspector(s) can rotate among workers as long as the Special Inspector can reasonably confirm continuous compliance by each worker), unless the Authority Having Jurisdiction requires a unique Special Inspector be present for each worker.

Special Inspections-Periodic: Special inspection by the special inspector who is intermittently present where the work to be inspected has been or is being performed. Periodic inspections shall be performed at a frequency such that the special inspector attains confidence that the work being performed is satisfactory, even in his or her absence. Periodic inspections shall be performed on a random basis. During the initial stages of the tasks, more frequent inspections may (but not necessarily) be warranted to establish the effectiveness of the work being performed, but subsequently reduced upon the satisfaction of the qualified Special Inspector.

Special Inspector: A person qualified by relevant and verifiable experience as required per this statement and employed or retained by an approved agency and approved by the City of Omaha as having the competence necessary to inspect a particular type of construction requiring special inspection.

Structural Observation: The visual observation of the structural system by a registered design professional for general conformance to the approved construction documents. Structural observation does not include or waive the responsibility for the inspections and special inspections required by the Construction Documents, this statement, and the Building Code.

Quality Assurance Plan

This Statement of Special Inspections (in its entirety) serves as the Quality Assurance Plan and includes the following building systems (indicated by an "X"):

- ☒ Structural Steel
- ☒ Steel – Other than Structural
- ☒ Cast-in-Place Concrete
- ☐ Precast Concrete
- ☐ Masonry
- ☐ Wood Construction
- ☒ Cold-Formed Steel Framing
- ☒ Soils
- ☐ Deep Foundations
- ☐ Architectural Systems
- ☐ Mechanical & Electrical Systems
- ☐ Fire Protection Systems
- ☐ Exterior Insulation and Finish System
- ☐ Special Cases

Schedule of Inspection and Testing Agencies

The Special Inspection and Testing Agencies shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the City of Omaha, Owner, and Architect, prior to commencing work. The qualifications of all personnel performing Special Inspection and Testing activities required qualifications of the associated Special Inspectors and Testing personnel for conducting these inspections and tests shall meet or exceed the minimum qualifications contained herein and are subject to the approval of the City of Omaha and the associated Registered Design Professional in Responsible Charge. The credentials of all Special Inspectors and Testing technicians shall be provided, if requested.

The Special Inspections Project Manager[a] shall complete the table below by listing the firm name and contact information for each applicable Special Inspection and Testing Agency to be used on the project. If a line item is not applicable, do not delete it, but write "N/A" in both columns.

Special Inspection Agencies (#)	Firm	Address, Telephone, e-mail
1. **Special Inspection Project Management Agency[a]**	*(TBD)*	
2.F Structural Steel – Fabrication – Special Inspector and Testing Agency[b]	*(TBD)*	
2.E Structural Steel – Erection – Special Inspector and Testing Agency[c]	*(TBD)*	
3. Steel Other than Structural Special Inspector and Testing Agency – (e.g., metal decking; <u>not</u> cold-formed steel)	*(TBD)*	
4. Cast-in-Place Concrete Special Inspector and Testing Agency	*(TBD)*	

9. Soils Special Inspector and Testing Agency	*(TBD)*	

[a]There shall be one Primary ("Prime") Special Inspection and Testing Agency (or Firm) responsible for the Project Management of all special inspections and testing, coordination with the subcontractors performing each required special inspection, coordination with the Contractor for scheduling, etc., reporting, and management. The Project Management Special Inspection and Testing Agency shall hold the single contract with the Owner for special inspection and testing services.

[b]A Special Inspector is still required for steel fabrication even with an AISC-Certified Fabricator, to review the Quality Control procedures, shop inspection reports, and either to perform testing or review testing reports.

[c]A Special Inspector is still required for steel erection even with an AISC-Certified Erector, to review the Quality Control procedures, field inspection reports, and either to perform testing or review testing reports.

Qualifications of Special Inspectors and Testing Technicians

The qualifications of all personnel performing Special Inspection and testing activities are subject to the approval of the City of Omaha . The credentials of all Inspectors and testing technicians shall be provided, if requested.

Key for Minimum Qualifications of Inspection Agents:

Special Inspectors and Testing personnel performing special inspections and testing of construction projects must meet the minimum requirements outlined in the Schedules of Special Inspections and Testing below. Special Inspection and Testing personnel must also demonstrate competence to the satisfaction of the City of Omaha , which includes achieving and maintaining national certifications, as detailed in the schedules. Special Inspectors shall be employed by an Approved Agency for special inspection conforming to the requirements of ASTM E329.

Except for testing of materials and reporting of numerical results, the Special Inspector shall work under the general supervision of a Registered Professional with expertise in special inspection work. All reports and certification of compliance must be signed by the Registered Professional in Responsible Charge of the Special Inspection work (not the RDP Responsible for Design).

In order for work experience to count toward qualification, it must be based on verifiable work directly related to the category or type of Special Inspection or Testing involved. Any required certifications indicated in schedules shall be current.

Five or more years verifiable work experience as a qualified Special Inspector in one or more categories of work may fulfill up to half of the experience requirements in any other category, if such experience is acceptable to the Registered Professional in Responsible Charge of the Special Inspection work and is approved by the City of Omaha .

Five or more years verifiable work experience at a journeyman level in any category or type of work may fulfill up to half of the experience requirements in that category, if such experience is acceptable to the Registered Professional in Responsible Charge of the Special Inspection work and is approved by the City of Omaha .

An inspector who does not meet the qualifications for Special Inspector may be allowed to perform special inspection work, at the discretion of the Registered Professional in Responsible Charge of the Special Inspection work, provided the individual is working under direct and continuous supervision of a Special Inspector fully qualified for the type of work involved.

An inspector with an Engineer-in-Training Certification must work under the direct charge of the Registered Professional in Responsible Charge of the Special Inspection work.

Schedules of Special Inspections and Testing

Special Inspections and Testing shall be performed in accordance with the Construction Documents, this statement, and the Building Code. The schedules below are used to indicate the applicable construction requiring Testing and Special Inspections. More information is contained in the referenced standards, IBC references, and should be available from the qualified Special Inspector(s). The Contractor shall notify the Special Inspections Project Manager of applicable work a minimum of 24 hours in advance of commencement of work. The Testing and Special Inspection(s) shall be promptly completed without delaying the progress or correction of the work.

The Special Inspection Project Manager shall indicate (using Agency #) the Special Inspection and Testing Agency (or firm) that will perform each special inspection and testing task. The Agency # is the number listed next to the Inspector or Testing Laboratory in the table on pages **6 and 7** of this statement.

STEEL CONSTRUCTION[a]

Regardless of the governing Building Code, the Quality Assurance requirements contained in Chapter N of AISC 360-10 shall be implemented, as modified as indicated in this statement and the Contract Documents. Quality Control Inspections shall also be performed by the fabricator and erector per the requirements contained in Chapter N. The certifications and qualifications of the Quality Control Inspector(s) shall be available to the City of Omaha , Owner, and Architect, upon request.

Modifications to AISC 360-10:

1) Replace "O" and "Observe" with "Periodic", using the definition indicated herein, wherever occurs.
2) Replace "P" and "Perform" with "Continuous", using the definition indicated herein, wherever occurs.
3) The "QAI – Quality Assurance Inspector" is required to be a third-party Special Inspector, except where an AISC-Certified Fabricator is used for fabrication, and/or an AISC-Certified Erector is used for Erection, if approved by the Authority Having Jurisdiction. In such cases, the Special Inspections indicated in the schedule below, at a minimum, shall be performed by the AISC-Certified Fabricator or AISC-Certified Erector, as applicable. A third-party Special Inspector shall review the AISC-Certified Fabricator and/or AISC-Certified Erector's Quality Control procedures and practices, prior to initiating work, as well as, the Quality Control reports. In all cases, Non-Destructive Testing shall be performed by a third-party Special Inspector or, if performed by the AISC-Certified Fabricator or AISC-Certified Erector, review the reports per Section N7 of AISC 360.
4) The definition of "construction documents" shall be as contained in this statement. References to "shop drawings, erection drawings, or other work prepared as the Contractor's Work Plan shall be replaced with "construction documents".
5) Qualifications for Special Inspectors and Testing personnel shall be as contained in the schedule below.
6) "RCSC" references are to *Specification for Structural Joints Using High-Strength Bolts*, 2009.

☐ FABRICATOR EXCEPTION (AISC-CERTIFIED FABRICATOR) ☐ ERECTOR EXCEPTION (AISC-CERTIFIED ERECTOR)

SPECIAL INSPECTION AND TESTING (Continuous & Periodic is as Defined by the IBC and This Statement)	INDICATED BY "X" IF REQUIRED	AGENCY #	CONTINUOUS	PERIODIC	REFERENCE STANDARD	IBC REFERENCE (CODE YEAR)	MINIMUM QUALIFICATIONS OF SPECIAL INSPECTOR (MINIMUM REQUIRED YEARS OF RELEVANT AND VERIFIABLE EXPERIENCE IN PARENTHESIS)
1. Material verification of structural steel.	X	2E., 2F.					

a. Identification markings to conform to ASTM standards specified in the approved construction documents.	X	**2E., 2F.**		X	ASTM A 6 or ASTM A 568	1708.4	AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer (2)
b. Manufacturers' certified mill test reports.	X	**2E., 2F.**			ASTM A 6 or ASTM A 568	1708.4	AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer (2)
2. Inspection of welding[b] (also in accordance with AWS D1.1-2010):	X	**2E., 2F.**					
a. Structural steel, prior to welding:	X	**2E., 2F.**					
1) Welding procedure specifications (WPSs) available.	X	**2E., 2F.**	X		AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** ICC Structural Steel Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
2) Manufacturer certifications for welding consumables available.	X	**2E., 2F.**	X		AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** ICC Structural Steel Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
3) Material identification (type/grade).	X	**2E., 2F.**		X	AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** ICC Structural Steel Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
4) Welder identification system.\[b]	X	**2E., 2F.**		X	AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** ICC Structural Steel Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
5) Fit-up of groove welds (including joint geometry). • Joint Preparation • Dimensions (alignment, root opening, root face, bevel) • Cleanliness (condition of steel surfaces) • Tacking (tack weld quality and location) • Backing type and fit (if applicable)	X	**2E., 2F.**		X	AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)

6) Configuration and finish of access holes.	X	**2E., 2F.**		X	AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
7) Fit-up of fillet welds. • Dimensions (alignment, gaps at root) • Cleanliness (condition of steel surfaces) • Tacking (tack weld quality and location)	X	**2E., 2F.**		X	AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
b. Structural steel, <u>during</u> welding:	X	**2E., 2F.**					
1) Use of qualified welders.[b]	X	**2E., 2F.**		X	AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** ICC Structural Steel Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
2) Control and handling of welding consumables. • Packaging • Exposure control	X	**2E., 2F.**		X	AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
3) No welding over cracked tack welds.	X	**2E., 2F.**		X	AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
4) Environmental Conditions. • Wind speed within limits • Precipitation (none) and temperature	X	**2E., 2F.**		X	AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)

5) WPS followed. • Settings on welding equipment • Travel speed • Selected welding materials • Shielding gas type/flow rate • Prehear applied • Interpass temperature maintained (min./max.) • Proper position (F/V/H/OH) • Intermix of filler metals avoided unless approved	X	**2E., 2F.**		X	AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
6) Welding techniques. • Interpass and final cleaning • Each pass within profile limitations • Each pass meets quality requirements • No welding over paint or galvanizing	X	**2E., 2F.**		X	AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
7) Specifically the following welds shall be observed during the welding process, as indicated.	X	**2E., 2F.**					
i) Complete and partial joint penetration welds.	X	**2E., 2F.**	X2009 X2006	X2012	AWS D1.1	1704.3.1 (2006, 2009)	ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
ii) Multipass fillet welds.	X	**2E., 2F.**	X2009 X2006	X2012	AWS D1.1	1704.3.1 (2006, 2009)	ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
iii) Single-pass fillet welds > 5/16”.	X	**2E., 2F.**	X2009 X2006	X2012	AWS D1.1	1704.3.1 (2006, 2009)	ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)

iv) Plug and slot welds.	**X**	**2E., 2F.**	X2009 X2006	X2012	AWS D1.1	1704.3.1 (2009)	ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
v) Single-pass fillet welds ≤ 5/16".	**X**	**2E., 2F.**		X	AWS D1.1	1704.3.1 (2006, 2009)	ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
c. Structural steel, after welding:	**X**	**2E., 2F.**					
1) Welds cleaned.	**X**	**2E., 2F.**		X	AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
2) Size length and location of all welds.	**X**	**2E., 2F.**	X		AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
3) All welds meet visual acceptance criteria. • Crack prohibition • Weld/base-metal fusion • Crater cross section • Weld profiles • Weld size • Undercut 4) Porosity	**X**	**2E., 2F.**	X		AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
4) Arc strikes.	**X**	**2E., 2F.**	X		AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (3) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
5) k-area. When welding of doubler plates, continuity plates or stiffeners has been performed in the k-area, visually inspect the web k-area for cracks within 3 inches of the weld.	**X**	**2E., 2F.**	X		AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
6) Backing removed and weld tabs removed (if required).	**X**	**2E., 2F.**	X		AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)

7) Repair activities.	X	**2E., 2F.**	X		AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
8) Document acceptance or rejection of welded joint or member.	X	**2E., 2F.**	X		AISC 360: N5.4		ICC Structural Welding Special Inspector (2) **OR** AWS Welding Inspector (2) **OR** AWS Senior Welding Inspector (2) **OR** Canadian Standard Association Certified Welding Inspector (2)
d. Structural steel, nondestructive testing:[d] *Rates in accordance with Project Specification Section 051200.*	X	**2E., 2F.**					
Occupancy Category (2006, 2009)/Risk Category: *For reference per Section N5.5, AISC 360-10.*	X	*II*					
1) Complete joint penetration groove welds.	X	**2E., 2F.**			AISC 360: N5.5; AWS D1.1		ASNT NDT Level II (1) **OR** ASNT ACCP Level II (1) **OR** ASNT ACCP Professional Level III (1) **OR** ASNT SNT-TC-1A (1) **OR** ASNT CP-189 (1)
2) Weld Access Holes.	X	**2E., 2F.**			AISC 360: N5.5; AWS D1.1		ASNT NDT Level II (1) **OR** ASNT ACCP Level II (1) **OR** ASNT ACCP Professional Level III (1) **OR** ASNT SNT-TC-1A (1) **OR** ASNT CP-189 (1)
3. Inspection of bolting (also in accordance with RCSC):	X	**2E., 2F.**					
a. Prior to bolting:	X	**2E., 2F.**					
1) Manufacturer's certifications available for fastener materials.	X	**2E., 2F.**	X		AISC 360: N5.6; RCSC: 2.1, 9.1		ICC Structural Steel and Bolting Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer (2)
2) Fasteners marked in accordance with ASTM requirements.	X	**2E., 2F.**		X	AISC 360: N5.6; RCSC: Figure C-2.1, 9.1; ASTM Standards		ICC Structural Steel and Bolting Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer (2)
3) Proper fasteners selected for the joint detail (grade, type, bolt length if threads are to be excluded from shear plane).	X	**2E., 2F.**		X	AISC 360: N5.6; RCSC: 23.2, 2.7.2, 9.1		ICC Structural Steel and Bolting Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer (2)
4) Proper bolting procedure selected for joint detail.	X	**2E., 2F.**		X	AISC 360: N5. ; RCSC: 4.8		ICC Structural Steel and Bolting Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer

5) Connecting elements, including the appropriate faying surface condition and hole preparation, if specified, meet applicable requirements.	X	**2E., 2F.**		X	AISC 360: N5.6; RCSC: 3, 9.1, 9.3		ICC Structural Steel and Bolting Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer (2)
6) Pre-installation verification testing by installation personnel observed and documented for fastener assemblies and methods used. (Exempt for snug-tight joints.)	X	**2E., 2F.**		X	AISC 360: N5.6; RCSC: 7, 9.2		ICC Structural Steel and Bolting Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer (2)
7) Proper storage provided for bolts, nuts, washers, and other fastener components. *Sealed containers, properly labeled with lot numbers, protected from the elements, used daily.*	X	**2E., 2F.**		X	AISC 360: N5.6; RCSC: 2.2, 8, 9.1		ICC Structural Steel and Bolting Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer (2)
b. <u>During</u> bolting:[c]	X	**2E., 2F.**					
1) Fastener assemblies, of suitable condition, placed in all holes and washers (if required) are positioned as required.	X	**2E., 2F.**		X	AISC 360: N5.6; RCSC: 8.1, 9.1		ICC Structural Steel and Bolting Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer (2)
2) Joint brought to the snug-tight condition. For pretensioned or slip-critical bolts, this shall be verified prior to the pretensioning operation.	X	**2E., 2F.**		X	AISC 360: N5.6; RCSC: 8.1, 9.1		ICC Structural Steel and Bolting Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer (2)
3) The fastener component which is not turned by the wrench shall be prevented from rotating.	X	**2E., 2F.**	X [c]	X [c]	AISC 360: N5.6; RCSC: 8.2, 9.2		ICC Structural Steel and Bolting Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer (2)
4) Fasteners are pretenioned in accordance with the RCSC Specification, progressing systematically from the most rigid point toward the free edges. (Exempt for snug-tight joints.)[c]	X	**2E., 2F.**	X [c]	X [c]	AISC 360: N5.6; RCSC: 8.2, 9.2		ICC Structural Steel and Bolting Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer (2)
c. <u>After</u> bolting:	X	**2E., 2F.**					

1) Document acceptance or rejection of bolted connections.	**X**	**2E., 2F.**	X		AISC 360: N5.6		ICC Structural Steel and Bolting Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer (2)
4. Inspection of all steel frame joint details for compliance with approved construction documents: a. Details such as bracing and stiffening. b. Member locations. c. Application of joint details at each connection.	**X**	**2E., 2F.**		X	AISC 360: N5.6		ICC Structural Steel and Bolting Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer (2)
5. Inspection during placement of anchor rods and other embedments supporting structural steel. *The diameter, grade, type, and length of all anchor rods and embedded items, and the extent or depth of embedment into concrete and protrusion above, shall be verified prior to placement of concrete.*	**X**	**2E., 2F.**		X	AISC 360: N5.6		ICC Structural Steel and Bolting Special Inspector (2) **OR** AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer (2)

[a]Special Inspections and Testing requirements for steel other than structural steel and cold-formed steel framing are listed in separate schedules.

[b]The fabricator or erector, as applicable, shall maintain a system by which a welder who has welded a joint or member can be identified. Stamps, if used, shall be the low-stress type. The Special Inspector shall verify the qualifications of welders, including identifying those welders whose work appears to be below the requirements of AWS D1.1.

[c]For pretensioned joints and slip-critical joints, where the installer is using the turn-of-nut method with matchmarking techniques, the direct-tension-indicator method, or twsti-off-type tension control bolt method, the Special Inspector need not be present during the installation of fasteners. For pretensioned joints and slip-critical joints, where the installer is using the calibrated wrench method or turn-of-nut method without matchmarking techniques, the Special Inspector shall be present during the installation of fasteners. For snug-tight joints, the inspector shall periodically observe the installation.

[d]Proposals for Special Inspection and Testing services shall assume the rates of reduction for testing permitted by AISC 360-10 and AISC 341-10 (as applicable) (after the initial sampling specified), and assumed to be approved by the Engineer of Record and Authority Having Jurisdiction Any Testing and/or Special Inspections above this reduced rate (after the initial sampling specified) shall be charged to the Contractor and not passed on to the Owner. Also, costs for retesting and/or reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents shall be charged to the Contractor and not passed on to the Owner.

STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL[a]

SPECIAL INSPECTION AND TESTING (Continuous & Periodic is as Defined by the IBC and This Statement)	INDICATED BY "X" IF REQUIRED	AGENCY #	CONTINUOUS	PERIODIC	REFERENCE STANDARD	IBC REFERENCE (CODE YEAR)	MINIMUM QUALIFICATIONS OF SPECIAL INSPECTOR (MINIMUM REQUIRED YEARS OF RELEVANT AND VERIFIABLE EXPERIENCE IN PARENTHESIS)
1. Material verification of cold-formed steel deck:	X	3.					
a. Identification markings to conform to ASTM standards specified in the approved construction documents.	X	3.		X	Applicable ASTM Standards		
b. Manufacturer's certified test reports.	X	3.		X			
2. Placement of steel deck (prior to concrete placement, if applicable).	X	3.		X			AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer (2)
a. For attachment by fastening other than welding, verification of the fasteners to be used prior to the start of the work, observations of the work in progress to confirm installation in conformance with the manufacturer's recommendations, and a visual inspection of the completed installation (prior to concrete placement, if applicable).	X	3.		X			AWS/AISC Steel Structure Inspector (2) **OR** Registered Civil or Structural Engineer (2)
4. Inspection of welding:	X	3.					
a. Cold-formed steel deck:	X	3.					
1) Floor (composite and non-composite) and roof deck welds.	X	3.		X	AWS D1.3		Per AWS D1.3

[a]Special Inspections and Testing requirements for structural steel and cold-formed steel framing are listed in separate schedules.

CONCRETE CONSTRUCTION

SPECIAL INSPECTION AND TESTING (Continuous & Periodic is as Defined by the IBC and This Statement)	INDICATED BY "X" IF REQUIRED	AGENCY #	CONTINUOUS	PERIODIC	REFERENCE STANDARD	IBC REFERENCE (CODE YEAR)	MINIMUM QUALIFICATIONS OF SPECIAL INSPECTOR (MINIMUM REQUIRED YEARS OF RELEVANT AND VERIFIABLE EXPERIENCE IN PARENTHESIS)
1. Inspection of reinforcing steel, including prestressing tendons, and placement. *Inspect size, spacing, cover, positioning and grade of reinforcing steel. Verify that reinforcing bars are free of form oil or other deleterious materials. Inspect bar laps and mechanical splices. Verify that bars are adequately tied and supported on chairs or bolsters.*	X	4.		X	ACI 318: 3.5, 7.1-7.7	1913.4 (2006, 2009); 1910.4 (2012)	ICC Reinforced Concrete Special Inspector *plus* ACI Concrete Field Testing Technician – Grade 1 (2) **OR** ACI Concrete Construction Special Inspector (2) **OR** Registered Civil or Structural Engineer (2)
3. Inspection of anchors/bolts to be installed in concrete prior to and during placement. *Inspect size, positioning and embedment of anchor rods/bolts. Inspect concrete placement and consolidation around anchors.*	X	4.	X[2009] X[2006]	X[2012]	ACI 318: 8.1.3, 21.2.8	1911.5 (2006); 1911.5, 1912.1 (2009); 1808.5, 1909.1 (2012)	ICC Reinforced Concrete Special Inspector *plus* ACI Concrete Field Testing Technician – Grade 1 (2) **OR** ACI Concrete Construction Special Inspector (2) **OR** Registered Civil or Structural Engineer (2)
4. Inspection of anchors installed in hardened concrete.[a]	X	4.		X	ACI 318: 3.8.6, 8.1.3, 21.2.8	1912.1 (2009); 1909.1 (2012)	ICC Reinforced Concrete Special Inspector *plus* ACI Concrete Field Testing Technician – Grade 1 (2) **OR** ACI Concrete Construction Special Inspector (2) **OR** Registered Civil or Structural Engineer (2)
5. Verify use of required design mix. *Review concrete batch tickets and verify compliance with approved mix design. Verify that water added at the site does not exceed that allowed by the mix design.*	X	4.		X	ACI 318: Ch. 4, 5.2-5.4	1904.2.2, 1913.2, 1913.3 (2006, 2009); 1904.2, 1910.2, 1910.3 (2012)	ICC Reinforced Concrete Special Inspector *plus* ACI Concrete Field Testing Technician – Grade 1 (1) **OR** ACI Concrete Construction Special Inspector (1) **OR** Registered Civil or Structural Engineer (1)

6. Sampling fresh concrete at time test specimens fabricated: slump *(ASTM C143)*, air content *(ASTM C231 or C173)*, temperature *(ASTM C1064)*, and strength *(ASTM C31 & C39)* of test specimens.	**X**	**4.**	X		ASTM C 172, C 31; ACI 318: 5.6, 5.8	1913.10 (2006, 2009); 1910.10 (2012)	ACI Concrete Field Testing Technician – Grade 1 (0.5)
7. Inspection of concrete and shotcrete placement for proper application techniques. *Inspect placement of concrete. Verify that concrete conveyance and depositing avoids segregation or contamination. Verify that concrete is properly consolidated.*	**X**	**4.**	X		ACI, 318: 5.9, 5.10	1913.6, 1913.7, 1913.8 (2006, 2009); 1910.6, 1910.7, 1910.8 (2012)	ICC Reinforced Concrete Special Inspector *plus* ACI Concrete Field Testing Technician – Grade 1 (1) **OR** ACI Concrete Construction Special Inspector (1) **OR** Registered Civil or Structural Engineer (1)
8. Inspection for maintenance of specified curing temperature and techniques. *Inspect curing, cold weather protection and hot weather protection procedures.*	**X**	**4.**		X	ACI, 318: 5.11-5.13	1913.9 (2006, 2009); 1910.9 (2012)	ICC Reinforced Concrete Special Inspector *plus* ACI Concrete Field Testing Technician – Grade 1 (1) **OR** ACI Concrete Construction Special Inspector (1) **OR** Registered Civil or Structural Engineer (1)
11. Verification of in-situ concrete strength prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and slabs.	**X**	**5.**		X	ACI 318: 6.2		[ACI Concrete Laboratory Testing Technician – Grade 1 (0.5) *or* ACI Strength Testing Technician (0.5)] *PLUS* [ICC Reinforced Concrete Special Inspector (1) *or* ACI Concrete Construction Special Inspector (1) *or* Registered Civil or Structural Engineer (1)] (Can be two different individuals.)
12. Inspect formwork for shape, location and dimension of the concrete member being formed	**X**	**4.**		X	ACI 318: 6.1.1		No certifications or licenses required, but 3 months of related, verifiable experience required.

[a]Specific requirements for special inspection shall be included in the research report for the anchor issued by an approved source in accordance with ACI 355.2 or other qualification procedures.

The special inspections and verifications for concrete construction shall not be required for the following, per IBC:

1) Isolated spread concrete footings of buildings three stories or less above grade plane that are fully supported on earth or rock.
2) Nonstructural concrete slabs supported directly on the ground, including prestressed slabs on grade.
3) Concrete patios, driveways and sidewalks, on grade.

SOILS

SPECIAL INSPECTION AND TESTING (Continuous & Periodic is as Defined by the IBC and This Statement)	INDICATED BY "X" IF REQUIRED	AGENCY #	CONTINUOUS	PERIODIC	REFERENCE STANDARD	IBC REFERENCE (CODE YEAR)	MINIMUM QUALIFICATIONS OF SPECIAL INSPECTOR (MINIMUM REQUIRED YEARS OF RELEVANT AND VERIFIABLE EXPERIENCE IN PARENTHESIS)
1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity.	X	9.		X			ICC Soils Special Inspector (1) **OR** NICET Level II Cert. (1) **OR** Registered Civil/Geotechnical/or Structural Engineer (1) **OR** Registered Geologist (1)
2. Verify excavations are extended to proper depth and have reached proper material.	X	9.		X			ICC Soils Special Inspector (1) **OR** NICET Level II Cert. (1) **OR** Registered Civil/Geotechnical/or Structural Engineer (1) **OR** Registered Geologist (1)
3. Perform classification and testing of controlled fill materials.	X	9.		X			ICC Soils Special Inspector (0.5) **OR** NICET Level I Cert. (0.5) **OR** Engineer in Training (EIT) Cert. (1) **OR** Registered Civil/Geotechnical/or Structural Engineer (0.5) **OR** Registered Geologist (0.5)
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of controlled fill.	X	9.	X				ICC Soils Special Inspector (1) **OR** NICET Level II Cert. (1) **OR** Registered Civil/Geotechnical/or Structural Engineer (1) **OR** Registered Geologist (1)
5. Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly.	X	9.		X			ICC Soils Special Inspector (1) **OR** NICET Level II Cert. (1) **OR** Registered Civil/Geotechnical/or Structural Engineer (1) **OR** Registered Geologist (1)

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory.
   2. Operation manuals for systems, subsystems, and equipment.
   3. Product maintenance manuals.
   4. Systems and equipment maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
   1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
   2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:
   1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
      a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
      b. Enable inserted reviewer comments on draft submittals.
   2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect, through Construction Manager, will return two copies.

C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
   1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
   1. List of documents.
   2. List of systems.
   3. List of equipment.
   4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR OPERATION AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
   1. Title page.
   2. Table of contents.
   3. Manual contents.

B. Title Page: Include the following information:
   1. Subject matter included in manual.
   2. Name and address of Project.
   3. Name and address of Owner.
   4. Date of submittal.
   5. Name and contact information for Contractor.
   6. Name and contact information for Construction Manager.
   7. Name and contact information for Architect.
   8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
   9. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
   1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
   1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
   2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
   1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
      a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
      b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
   2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
   3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
   4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
   5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
      a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
      b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
   1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
   2. Performance and design criteria if Contractor has delegated design responsibility.
   3. Operating standards.
   4. Operating procedures.
   5. Operating logs.
   6. Wiring diagrams.
   7. Control diagrams.
   8. Piped system diagrams.
   9. Precautions against improper use.
   10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:
1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
   1. Standard maintenance instructions and bulletins.
   2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
   3. Identification and nomenclature of parts and components.
   4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
   1. Test and inspection instructions.
   2. Troubleshooting guide.
   3. Precautions against improper maintenance.
   4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   5. Aligning, adjusting, and checking instructions.
   6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
   1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
   2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
   1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
   2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
   1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
   1. Do not use original project record documents as part of operation and maintenance manuals.
   2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."

F. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Structural steel.
2. Grout.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 COORDINATION

A. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication and erection of structural-steel components.
1. Include plans, sections, and details for erection of structural steel components.
2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
3. Include embedment Drawings.
4. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
5. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer fabricator and testing agency.

B. Welding certificates.

C. Mill test reports for structural steel, including chemical and physical properties.

D. Product Test Reports: For the following:
1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Nonshrink grout.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Comply with applicable provisions of the following specifications and documents:
   1. AISC 303.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
   1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
   1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
   2. Clean and relubricate bolts and nuts that become dry or rusty before use.
   3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M.

B. Channels, Angles-Shapes: ASTM A 36/A 36M.

C. Plate and Bar: ASTM A 36/A 36M.

D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.

E. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
   1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.

C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers.
   1. Finish: Hot-dip or mechanically deposited zinc coating.
   2. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with mechanically deposited zinc coating finish.

D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
   1. Finish: Mechanically deposited zinc coating.

E. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
   1. Configuration: Straight.
   2. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
   3. Plate Washers: ASTM A 36/A 36M carbon steel.
   4. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
   5. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

F. Threaded Rods: ASTM A 36/A 36M.
   1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
   2. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
   3. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

G. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.3 PRIMER

A. Primer: Comply with Section 099113 "Exterior Painting,"

B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

C. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
   1. Camber structural-steel members where indicated.
   2. Fabricate beams with rolling camber up.
   3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
   4. Mark and match-mark materials for field assembly.
   5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
   1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
   1. Cut, drill, or punch holes perpendicular to steel surfaces.
   2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
   3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:
   1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
   2. Surfaces to be field welded.
   3. Surfaces of high-strength bolted, slip-critical connections.
   4. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
   1. SSPC-SP 2, "Hand Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
   1. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
   1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
   1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M. All welds shall be visually inspected. All fillet or partial penetration welds in moment connected parts of moment connections and all complete joint penetration welds shall be tested by one of the following methods:
   1. Liquid Penetrant Inspection: ASTM E 165.
   2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
   3. Ultrasonic Inspection: ASTM E 164.
   4. Radiographic Inspection: ASTM E 94.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
   1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

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

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Baseplates Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
   1. Set plates for structural members on wedges, shims, or setting nuts as required.
   2. Weld plate washers to top of baseplate.
   3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
   4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M. All welds shall be visually inspected. All fillet or partial penetration welds in moment connected parts of moment connections and all complete joint penetration welds shall be tested by one of the following methods::
a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

3.6 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.

B. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting"

END OF SECTION 051200

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Roof deck.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated. Data must include manufacturer's standard load tables indicating that structural capacities as indicated in PERFORMANCE REQUIREMENTS are satisfied.

B. Shop Drawings:
   1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
   1. Power-actuated mechanical fasteners.

D. Evaluation Reports: For steel deck, from ICC-ES.

E. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Structural Capacities:
1. All deck shall be capable of supporting the loads indicated below, based on an unshored span condition with a total load deflection limited to L/240 of the span length.
2. Roof Deck shall safely support a minimum total (dead plus live) load of 43 psf over a span of as indicated on drawings..

2.2 ROOF DECK

A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G60 (Z180) zinc coating.
2. Deck Profile: As indicated.
3. Profile Depth: As indicated.
4. Design Uncoated-Steel Thickness: 0.0358 inch (0.91 mm).
5. Span Condition: As indicated.
6. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.3 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

G. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck. For drains, cut holes in the field.

H. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.

I. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches (38 mm) long, and as follows:
   1. Weld Diameter: 5/8 inch (16 mm), nominal.
   2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 12 inches (305 mm) apart in the field of roof and 6 inches (150 mm) apart in roof corners and perimeter, based on roof-area definitions in FMG Loss Prevention Data Sheet 1-28.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 36 inches (914 mm), and as follows:
   1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
   2. Mechanically clinch or button punch.
   3. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:

1. End Joints: Lapped 2 inches (51 mm) minimum.

D. Alternate methods of deck attachment may be offered by the Contractor as a substitution to the attachments defined herein or on the Drawings. Alternate methods of attachment must offer at least the same load capacity (diaphragm shear, uplift, gravity) as that offered by the indicated attachment system.

E. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches (305 mm) apart with at least one fastener at each corner.
1. Install reinforcing channels or zees in ribs to span between supports and weld or mechanically fasten.

F. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform tests and inspections.

B. Field welds shall be subject to inspection.

C. Testing agency shall report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

F. Prepare test and inspection reports.

3.5 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surface.

C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100

SECTION 071900 - WATER REPELLENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes penetrating water-repellent treatments for the following vertical and horizontal surfaces:
   1. Cast-in-place concrete.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include manufacturer's printed statement of VOC content.
   2. Include manufacturer's standard colors.
   3. Include manufacturer's recommended number of coats for each type of substrate and spreading rate for each separate coat.
   4. Include printout of current "MPI Approved Products List" for each product category specified in Part 2 that specifies water repellents approved by MPI, with the proposed product highlighted.

B. Samples: For each type of water repellent and substrate indicated, 12 by 12 inches (300 by 300 mm) in size, with specified water-repellent treatment applied to half of each Sample.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Applicator.

B. Product Certificates: For each type of water repellent.

C. Preconstruction Test Reports: For water-repellent-treated substrates.

D. Field quality-control reports.

E. Sample Warranty: For special warranty.

1.6 QUALITY ASSURANCE

A. Applicator Qualifications: An employer of workers trained and approved by manufacturer.

B. MPI Standards: Comply with MPI standards indicated and provide water repellents listed in its "MPI Approved Products List."

C. Mockups: Prepare mockups of each required water repellent on each type of substrate required to demonstrate aesthetic effects, for preconstruction testing, and to set quality standards for materials and execution.
   1. Locate mockups on masonry sample panels.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Testing: Engage a qualified testing agency to perform preconstruction testing of water repellents on field mockups.
1. In addition to verifying performance requirements, use mockups to verify manufacturer's written instructions for application procedure and optimum rates of product application to substrates.
2. Propose changes to materials and methods to suit Project.
3. Notify Architect seven days in advance of the dates and times when mockups will be tested.

1.8 FIELD CONDITIONS

A. Limitations: Proceed with application only when the following existing and forecasted weather and substrate conditions permit water repellents to be applied according to manufacturers' written instructions and warranty requirements:
1. Concrete surfaces and mortar have cured for not less than 28 days.
2. Ambient temperature is above 40 deg F (4.4 deg C) and below 100 deg F (37.8 deg C) and will remain so for 24 hours.
3. Substrate is not frozen and substrate-surface temperature is above 40 deg F (4.4 deg C) and below 100 deg F (37.8 deg C).
4. Rain or snow is not predicted within 24 hours.
5. Windy conditions do not exist that might cause water repellent to be blown onto vegetation or surfaces not intended to be treated.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and Applicator agree to repair or replace materials that fail to maintain water repellency specified in "Performance Requirements" Article within specified warranty period.
1. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Performance: Water repellents shall meet the following performance requirements as determined by preconstruction testing on manufacturer's standard substrates representing those indicated for this Project.

B. Water Absorption: Minimum 80 percent reduction of water absorption after 24 hours for treated compared to untreated specimens when tested according to the following:
1. Cast-in-Place Concrete: ASTM C 642.

2.2 PENETRATING WATER REPELLENTS

A. Silane/Siloxane-Blend, Penetrating Water Repellent: Clear, silane and siloxane blend with 400 g/L or less of VOCs.
1. Water repellent shall be compatible with Graffiti Resistant Coating as specified in Section 099623.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements and conditions affecting performance of the Work.
   1. Verify that surfaces are clean and dry according to water-repellent manufacturer's requirements. Check moisture content in three representative locations by method recommended by manufacturer.
   2. Verify that there is no efflorescence or other removable residues that would be trapped beneath the application of water repellent.
   3. Verify that required repairs are complete, cured, and dry before applying water repellent.

B. Test pH level according to water-repellent manufacturer's written instructions to ensure chemical bond to silica-containing or siliceous minerals.

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

3.2 PREPARATION

A. New Construction and Repairs: Allow concrete and other cementitious materials to age before application of water repellent, according to repellent manufacturer's written instructions.

B. Cleaning: Before application of water repellent, clean substrate of substances that could impair penetration or performance of product according to water-repellent manufacturer's written instructions and as follows:
   1. Cast-in-Place Concrete: Remove oil, curing compounds, laitance, and other substances that inhibit penetration or performance of water repellents according to ASTM E 1857.

C. Protect adjoining work, including mortar and sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live vegetation.

D. Coordination with Mortar Joints: Do not apply water repellent until pointing mortar for joints adjacent to surfaces receiving water-repellent treatment has been installed and cured.

E. Coordination with Sealant Joints: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
   1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those required.

3.3 APPLICATION

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.

B. Apply coating of water repellent on surfaces to be treated to the point of saturation. Apply coating in dual passes of uniform, overlapping strokes. Remove excess material; do not allow material to puddle beyond saturation. Comply with manufacturer's written instructions for application procedure unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

A. Testing of Water-Repellent Material: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when water repellent is being applied:
   1. Owner will engage the services of a qualified testing agency to sample water-repellent material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
   2. Testing agency will perform tests for compliance of water-repellent material with product requirements.
   3. Owner may direct Contractor to stop applying water repellents if test results show material being used does not comply with product requirements. Contractor shall remove noncomplying material from Project site, pay for testing, and correct deficiency of surfaces treated with rejected materials, as approved by Architect..

3.5 CLEANING

A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Correct damage to work of other trades caused by water-repellent application, as approved by Architect.

B. Comply with manufacturer's written cleaning instructions.

END OF SECTION 071900

SECTION 07 4213 - METAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Concealed-fastener, lap-seam metal wall panels.
2. Metal soffit panels.

B. Related Sections:
1. Section 07 6200, SHEET METAL FLASHING AND TRIM, for flashing and other sheet metal work that is not part of metal wall panel assemblies.

1.3 DEFINITION

A. Metal Wall Panel Assembly: Metal wall panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weathertight wall system.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Metal wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Delegated Design: Design metal wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer using performance requirements and design criteria indicated.

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).

D. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:
1. Wind Loads: Determine loads based on the following minimum design wind pressures:
   a. Uniform pressure as indicated on Drawings.
2. Deflection Limits: Metal wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/240 of the span.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of wall panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory-, shop- and field-assembled work.
   1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:10):
      a. Flashing and trim.
      b. Anchorage systems.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
   1. Metal Wall and Soffit Panels: 12 inches (305 mm) long by actual panel width. Include fasteners, closures, and other metal wall panel accessories.
   2. Trim and Closures: 12 inches (305 mm) long. Include fasteners and other exposed accessories.
   3. Accessories: 12-inch- (305-mm-) long Samples for each type of accessory.

D. Field quality-control reports.

E. Maintenance Data: For metal wall panels to include in maintenance manuals.

F. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

C. Source Limitations: Obtain each type of metal wall panel from single source from single manufacturer.

D. Fire-Resistance Ratings: Where indicated, provide metal wall panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.

B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal wall panel for period of metal wall panel installation.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal wall panels to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal wall panel fabrication, and indicate measurements on Shop Drawings.

1.9 COORDINATION

A. Coordinate metal wall panel assemblies with rain drainage work, flashing, trim, and construction of studs, soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including rupturing, cracking, or puncturing.
      b. Deterioration of metals and other materials beyond normal weathering.
   2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

A. Aluminum Sheet: Mill-finish, alloy 3003-H14 as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
   1. Surface: Smooth, flat finish.
   2. Exposed Finish:
      a. 2-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   3. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm) (Alodine).

2.2 MISCELLANEOUS METAL FRAMING

A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G60 (Z180) hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.

B. Subgirts: Manufacturer's standard C- or Z-shaped sections.

C. Base or Sill Angles: As required to meet performance requirements.

D. Cold-Rolled Furring Channels: Minimum 1/2-inch- (13-mm-) wide flange.
1. Nominal Thickness: As required to meet performance requirements.
2. Depth: As indicated.
3. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with 0.040-inch (1.02-mm) nominal thickness.
4. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.57-mm-) diameter wire, or double strand of 0.048-inch- (1.22-mm-) diameter wire.

E. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (32 mm), wall attachment flange of 7/8 inch (22 mm), and depth required to fit insulation thickness indicated.
1. Nominal Thickness: As required to meet performance requirements.

F. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

2.3 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

A. General: Provide factory-formed metal wall panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Sobotec, Surflex Modular Panel System Aluminum Panel SL-2000P, or comparable product by one of the following:
a. AEP-Span.
b. Berridge Manufacturing Company.
c. CENTRIA Architectural Systems.
d. MBCI; Div. of NCI Building Systems.
e. Petersen Aluminum Corporation.
f. Dri Design.
2. Material: Aluminum sheet, 0.080 inch (2 mm) thick.
a. Exterior Finish: 2-coat fluoropolymer.
b. Color: As selected by Architect from manufacturer's full range.

2.4 METAL SOFFIT PANELS

A. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

B. Metal Soffit Panels: Match profile and material of metal wall panels, from same manufacturer.
1. Finish: Match finish and color of metal wall panels.
2. Sealant: Factory applied within interlocking joint.

C. Flush-Profile Metal Soffit Panels: Solid and perforated panels formed with vertical panel edges and flat pan between panel edges; with flush joint between panels. See Drawings for perforated soffit panel locations.

2.5 ACCESSORIES

A. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal wall panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

B. Flashing and Trim: Formed from 0.018-inch (0.46-mm) minimum thickness, aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal wall panels.

2.6 FABRICATION

A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.
   a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are

not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of work.
   1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
   2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
   3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.

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

3.2 PREPARATION

A. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.
   1. Soffit Framing: Wire-tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.3 METAL WALL PANEL INSTALLATION

A. General: Install metal wall panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Shim or otherwise plumb substrates receiving metal wall panels.
   2. Install screw fasteners in predrilled holes.
   3. Locate and space fastenings in uniform vertical and horizontal alignment.
   4. Install flashing and trim as metal wall panel work proceeds.
   5. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
   6. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
   7. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.

B. Fasteners:
   1. Aluminum Wall Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by metal wall panel manufacturer.

D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.

E. Lap-Seam Metal Wall Panels: Fasten metal wall panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
   1. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
   2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal wall panels.
   3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
   4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
   5. Provide sealant tape at lapped joints of metal wall panels and between panels and protruding equipment, vents, and accessories.
   6. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps; on side laps of nesting-type panels; on side laps of corrugated nesting-type, ribbed, or fluted panels; and elsewhere as needed to make panels weathertight.
   7. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.

F. Zee Clips: Provide Zee clips of size indicated or, if not indicated, as required to act as standoff from subgirts for thickness of insulation indicated. Attach to subgirts with fasteners.

3.4 METAL SOFFIT PANEL INSTALLATION

A. In addition to complying with requirements of "Metal Wall Panel Installation, General" Article, install metal soffit panels to comply with the requirements of this article.

B. Metal Soffit Panels: Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing.
   1. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.

3.5 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
   1. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
   1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
   2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (605 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Water Penetration: Test areas of installed system indicated on Drawings for compliance with system performance requirements according to ASTM E 1105 at minimum differential pressure of 20 percent of inward-acting, wind-load design pressure as defined by SEI/ASCE 7, but not less than 6.24 lbf/sq. ft. (300 Pa).

C. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect and test completed metal wall panel installation, including accessories.

D. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.

E. Additional tests and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.

B. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 4213

SECTION 075323 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Adhered ethylene-propylene-diene-terpolymer (EPDM) roofing system.
2. Roof insulation.

B. Related Requirements:
1. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
2. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.
3. Section 221423 "Storm Drainage Piping Specialties" for roof drains.

1.3 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav listing.

B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:
1. Layout and thickness if insulation.
2. Base flashings and membrane terminations.
3. Flashing details at penetrations.
4. Tapered insulation, thickness, and slopes.
5. Roof plan showing orientation of steel roof deck and orientation of roof membrane and fastening spacings and patterns for mechanically fastened roofing system.
6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

C. Samples for Verification: For the following products:
1. Roof membrane and flashings of color required.

D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Manufacturer Certificates:
1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

a. Submit evidence of complying with performance requirements.

2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

C. Evaluation Reports: For components of roofing system, from ICC-ES.

D. Field quality-control reports.

E. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, cover boards, and other components of roofing system.

2. Warranty Period: 20 years from Date of Substantial Completion.

B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such

as roof membrane, base flashing, roof insulation, fasteners, cover boards, for the following warranty period:
1. Warranty Period: Two years from Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing system and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and flashings shall remain watertight.
1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D 3746, ASTM D 4272, or the Resistance to Foot Traffic Test in FM Approvals 4470.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.

C. Wind Uplift Resistance: Design roofing system to resist the wind uplift pressures stated in the Structural Drawings.

2.2 ETHYLENE-PROPYLENE-DIENE-TERPOLYMER (EPDM) ROOFING

A. EPDM Sheet: ASTM D 4637/D 4637M, Type I, nonreinforced, EPDM sheet.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Carlisle SynTec Incorporated.
b. Firestone Building Products.
c. GenFlex Roofing Systems.
d. Johns Manville; a Berkshire Hathaway company.
2. Thickness: 60 mils (1.5 mm) nominal.
3. Exposed Face Color: Black
4. Source Limitations: Obtain components for roofing system from roof membrane manufacturer or manufacturers approved by roof membrane manufacturer.

2.3 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.

B. Sheet Flashing: 60-mil- (1.5-mm-) thick EPDM, partially cured or cured, according to application.

C. Bonding Adhesive: Manufacturer's standard

D. Lap Sealant: Manufacturer's standard, single-component sealant.

E. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.

F. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick (25 mm wide by 1.3 mm thick), prepunched.

G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening components to substrate, and acceptable to roofing system manufacturer.

H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, molded pipe boot flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

2.4 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by EPDM roof membrane manufacturer.

B. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, 1.45-lb/cu. ft. (23-kg/cu. m)minimum density, 25-psi (173-kPa) minimum compressive strength square edged.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. DiversiFoam Products.
b. Dow Chemical Company (The).
c. Owens Corning.
2. Thermal Resistance: R-value of 5.0 per inch (25.4 mm).
3. Size: 48 by 48 inches (1219 by 1219 mm).
4. Thickness:
a. Base Layer: 1-1/2 inches (38 mm).

C. Tapered Insulation: Provide factory-tapered insulation boards.
1. Material: Match roof insulation.
2. Minimum Thickness: 1/4 inch (6.35 mm).
3. Slope:
a. Roof Field: 1/4 inch per foot (1:48) unless otherwise indicated on Drawings.
b. Saddles and Crickets: 1/2 inch per foot (1:24) unless otherwise indicated on Drawings.

2.5 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
1. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 053100 "Steel Decking."

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

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 ROOFING INSTALLATION, GENERAL

A. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.4 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Installation Over Metal Decking:
1. Install base layer of insulation with joints staggered not less than 24 inches (610 mm) in adjacent rows or end joints staggered not less than 12 inches (305 mm) in adjacent rows and with long joints continuous at right angle to flutes of decking.
   a. Locate end joints over crests of decking.
   b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
   c. Make joints between adjacent insulation boards not more than 1/4 inch (6 mm) in width.
   d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches (610 mm).
      1) Trim insulation so that water flow is unrestricted.
   e. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
   f. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
   g. Mechanically attach base layer of insulation using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.
      1) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.
2. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches (305 mm) from previous layer of insulation.
   a. Staggered end joints within each layer not less than 24 inches (610 mm) in adjacent rows.
   b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
   c. Make joints between adjacent insulation boards not more than 1/4 inch (6 mm) in width.
   d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches (610 mm).
   e. Trim insulation so that water flow is unrestricted.

f. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
g. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
h. and maintaining insulation in place.

3.5 ADHERED ROOFING INSTALLATION

A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.

B. Unroll membrane roof membrane and allow to relax before installing.

C. Start installation of roofing in presence of roofing system manufacturer's technical personnel if required for special warranty.

D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.

F. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeters.

G. Apply roof membrane with side laps shingled with slope of roof deck where possible.

H. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement.
1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.
2. Apply lap sealant and seal exposed edges of roofing terminations.
3. Apply a continuous bead of in-seam sealant before closing splice if required by roofing system manufacturer.

I. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape.
1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.
2. Apply lap sealant and seal exposed edges of roofing terminations.

J. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

K. Spread sealant or mastic bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to inspect substrate conditions, surface preparation, roof membrane application, sheet flashings, protection, and drainage components, and to furnish reports to Architect.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.

C. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.7 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing system, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075323

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SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Formed low-slope roof sheet metal fabrications.
2. Formed wall sheet metal fabrications.

B. Related Requirements:
1. Section 075323 EPDM ROOFING for materials and installation of sheet metal flashing and trim integral with roofing.
2. Section 074213 METAL WALL PANELS with metal wall panels.

1.3 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: For sheet metal flashing and trim.
1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of roof-penetration flashing.
8. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
9. Include details of special conditions.
10. Include details of connections to adjoining work.

C. Samples for Verification: For each type of exposed finish.
1. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.

2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of coping and roof edge flashing that is SPRI ES-1 tested.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
1. For copings and roof edge flashings that are SPRI ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.9 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20y ears from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. SPRI Wind Design Standard: Manufacture and install copings AND roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:
   1. Design Pressure: As indicated on Structural Drawings.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
   1. Exposed Coil-Coated Finish:
      a. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   2. Color: As selected by Architect from manufacturer's full range.
   3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
   1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
      a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
      b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
   2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight, and as specified in Section 079200, Joint Sealants.

E. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

F. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
   1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
   2. Obtain field measurements for accurate fit before shop fabrication.
   3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
   4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
   1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
   2. Use lapped expansion joints only where indicated on Drawings.

E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

G. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

H. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

I. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

J. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

K. Do not use graphite pencils to mark metal surfaces.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof Edge Flashing (Gravel Stop): Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long sections. Furnish with 6-inch- (150-mm-) wide, joint cover plates. Shop fabricate interior and exterior corners.
   1. Joint Style: Butted with expansion space and concealed backup plate.
   2. Fabricate with scuppers as shown on Drawings, to dimensions required with 4-inch- (100-mm-) wide flanges and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
   3. Fabricate from the Following Materials:
      a. Aluminum: 0.050 inch (1.27 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
   1. Verify compliance with requirements for installation tolerances of substrates.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
   3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

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

3.2 UNDERLAYMENT INSTALLATION

A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

3.3 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
   1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
   2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
   3. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
   4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
   5. Torch cutting of sheet metal flashing and trim is not permitted.
   6. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
   1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.

2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Do not solder metallic-coated steel and aluminum sheet.

H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch (75-mm) centers.

3.5 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall components.

3.6 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.7 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

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SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Silicone joint sealants.

B. Related Sections:
   1. Section 088000, "Glazing" for glazing sealants.

1.3 PRECONSTRUCTION TESTING

A. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
   1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
   2. Conduct field tests for each application indicated below:
      a. Each kind of sealant and joint substrate indicated.
   3. Notify Architect seven days in advance of dates and times when test joints will be erected.
      a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
         1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
   4. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
   5. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.4 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Joint-Sealant Schedule: Include the following information:
   1. Joint-sealant application and joint location.
   2. Joint-sealant manufacturer and product name.
   3. Joint-sealant formulation.
   4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

A. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.

B. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
   1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
   2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

C. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

D. Field-Adhesion Test Reports: For each sealant application tested.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.
   1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
   2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

D. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.7 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
   2. When joint substrates are wet.
   3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
   4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which silicone joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: 20 years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
   1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
   2. Disintegration of joint substrates from natural causes exceeding design specifications.
   3. Mechanical damage caused by individuals, tools, or other outside agents.
   4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

D. Colors of Exposed Joint Sealants shall be as follows:
   1. Joints separating two similar materials: match finish surface color.
   2. Joints separating two dissimilar materials: match wall surface color.

2.2 SILICONE JOINT SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Dow Corning Corporation; 791 or 795.
      b. GE Advanced Materials - Silicones; SilGlaze II SCS2800 or SilPruf SCS2000.
      c. Pecora Corporation; 864 or 895.
      d. Tremco Incorporated; Spectrem 2 or Spectrem 3.

B. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
   1. Products: Subject to compliance with requirements, provide the following:
      a. Pecora Corporation; 898.

2.3 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) Type O (open-cell material) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
   2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
      a. Concrete.
   3. Remove laitance and form-release agents from concrete.
   4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
      a. Metal.
      b. Glass.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated or required by the joint sealant manufacturer.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
1. Extent of Testing: Test completed and cured sealant joints as follows:
   a. Perform 10 tests for the first 1000 feet (300 m) of joint length for each kind of sealant and joint substrate.
2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
   a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
3. Inspect tested joints and report on the following:
   a. Whether sealants filled joint cavities and are free of voids.
   b. Whether sealant dimensions and configurations comply with specified requirements.
   c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint

substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
   a. Joints between metal panels.
   b. Joints between different materials listed above.
   c. Perimeter joints between materials listed above.
   d. Other joints as indicated.
2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 100/50 and Single component, nonsag, neutral curing, Class 50**.** The type of silicone building sealant shall be selected for each area of application as recommended by the sealant manufacturer.

END OF SECTION 079200

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:
   1. Glass for screen walls.
   2. Aluminum frames (deflection track frame).
   3. Glazing sealants and accessories.

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. IBC: International Building Code.

1.4 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   2. Review temporary protection requirements for glazing during and after installation.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of glass product; 12 inches (300 mm) square.

C. Glazing Accessory Samples: For sealants, in 12-inch (300-mm) lengths.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer, licensed in the state where the project is located, responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, glass testing agency and sealant testing agency.

B. Product Certificates: For glass.

C. Preconstruction adhesion and compatibility test report.

D. Sample Warranties: For special warranties.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

B. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.9 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
   1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
   2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
   3. Test no fewer than two Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
   4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
   5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.11 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
   1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F (4.4 deg C).

1.12 WARRANTY

A. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
   1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.

B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.

C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.
   1. Design Wind Pressures: As indicated on Structural Drawings.

D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
   1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.

D. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully

tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.

B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
   1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
   2. Distortion Limits:
      a. Maximum roller wave: .003 inch peak to valley in center of glass.
      b. Maximum allowable: .008 inch within 10-1/2 inches of the leading and/or trailing edge of glass.

C. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
   1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
   2. Distortion Limits:
      a. Maximum roller wave: .003 inch peak to valley in center of glass.
      b. Maximum allowable: .008 inch within 10-1/2 inches of the leading and/or trailing edge of glass.

2.5 LAMINATED GLASS

A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
   1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written instructions.
   2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
   3. Interlayer Color: Clear unless otherwise indicated.

2.6 ALUMINUM FRAMES FOR SCREEN WALL GLAZING

A. Basis-of-Design Product: Subject to compliance with requirements, provide the following or a comparable product by other manufacturer:
   1. Manufacturer: C.R. Laurence.
   2. Product: Aluminum Vertical Deflection Head Frame as shown on Drawings.

2.7 GLAZING SEALANTS

A. General:
   1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
   2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
   3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Dow Corning Corporation.
      b. GE Construction Sealants; Momentive Performance Materials Inc.
      c. Pecora Corporation.
      d. Tremco Incorporated.
   2. Applications: For the exterior perimeter of all glass panes where they abut frame members (unless recommended otherwise by the glass manufacturer), and butt joint glazing sealant between screen wall glazing panel joints as recommended by the glass manufacturer.

2.8 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
   1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
   2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
   1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
   2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.9 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.10 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
   1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
      a. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
   1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
   2. Presence and functioning of weep systems.
   3. Minimum required face and edge clearances.
   4. Effective sealing between joints of glass-framing members.

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

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
   2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
   1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 GLASS TYPES SCHEDULE

A. Glass Type GL-2: Clear laminated glass with two plies of fully tempered float glass.
   1. Minimum Thickness of Each Glass Ply: 8 mm.
   2. Interlayer Thickness: 0.060 inch (1.52 mm).
   3. Glass thickness and interlayer thickness to be verified by Contractor to meet the state design requirements.

END OF SECTION 088000

SECTION 088113 - DECORATIVE GLASS GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes the following decorative glass for exterior soffit applications:
   1. Silk-screened.
   2. Laminated.

B. Related Sections:
   1. Section 088000, "Glazing" for standard glass products.

1.3 DEFINITION

A. Glass Thickness: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Installed glazing systems shall withstand normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Design glass, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
   1. Differential deflection of adjacent unsupported edges shall not exceed glass thickness when subjected to 50 lbf/ft. (730 N/m) applied horizontally to one panel at any point up to 42 inches (1067 mm) above the adjacent walking surface.
   2. Base design on thickness at thinnest part of the glass.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1.6 SUBMITTALS

A. Product Data: For each decorative-glass and glazing product indicated.

B. Shop Drawings: For decorative glass. Show fabrication and installation details. Include the following:
   1. Size and location of penetrations.
   2. Glazing method.
   3. Mounting method.
   4. Attachments to other work.
   5. Full-size details of edge-finished profiles.

C. Glass Samples: For the following products, 12 inches (300 mm) square:
   1. Each type of decorative glass.
   2. Each edge treatment on type of decorative glass.
   3. Each decorative film overlay on type of decorative glass.
   4. Each applied coating on type of decorative glass.

D. Glazing Accessory Samples: For sealants, in 12-inch (300-mm) lengths.

E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

F. Qualification Data: For qualified Installer, fabricator and sealant testing agency.

G. Product Certificates: For each type of decorative glass, from manufacturer.

H. Preconstruction Adhesion and Compatibility Test Reports: Based on evaluation and comprehensive tests performed by a qualified testing agency, for laminated glass and glass with decorative film overlay.

I. Maintenance Data: For each type of decorative glass and each decorative film overlay to include in maintenance manuals.

J. Warranty: Sample of special warranty.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under NGA's Certified Glass Installer Program.

B. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

C. Source Limitations for Glass: Obtain each type of decorative glass from single source from single manufacturer.

D. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer, for each product and installation method.

E. Glazing Publications: Comply with published recommendations in GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual" unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

F. Safety Glazing: Where safety glazing is indicated, comply with testing requirements in 16 CFR 1201 for Category II materials.
   1. Labeling: Permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction . Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard that glass complies with.

G. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
   2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

H. Preinstallation Conference: Conduct conference at Project site .

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect decorative glass and glazing materials according to manufacturer's written instructions and as needed to prevent damage to surfaces and edges.

B. Retain packaging and sequencing numbers for decorative-glass units.

1.9 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings and construction contiguous with decorative glass by field measurements before fabrication.

1.10 WARRANTY

A. Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with requirements indicated. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with requirements indicated. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

2.2 MONOLITHIC-GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
1. Products: Subject to compliance with requirements, provide one of the following :
a. AFG Industries, Inc.; Krystal Klear.
b. Guardian Industries Corp.; UltraWhite.
c. Pilkington North America; Optiwhite.
d. PPG Industries, Inc.; Starphire.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.3 DECORATIVE GLASS TYPES

A. Decorative Glass Type GL-1: Laminated glass, ASTM C 1172. Use materials that have a proven record of not bubbling, discoloring, or losing physical and mechanical properties after fabrication and installation.
   1. Construction: Two plies of heat-strengthened fully tempered float glass.
   2. Thickness of Each Glass Ply: 3/8 inch (10.0 mm).
   3. Construction: Laminate glass with PVB interlayer to comply with interlayer manufacturer's written recommendations.
   4. Interlayer Thickness: 0.060 inch (1.52 mm).
   5. Comply with requirements for safety glazing.
   6. Interlayer Material Color and Pattern: Arctic Snow.
   7. Provide silkscreen frit pattern on #1 face. Pattern as shown on Drawings. Color of pattern: As selected by Architect from manufacturer’s standard colors.

2.4 GLAZING MATERIALS

A. Glazing Gaskets, Sealants, Tapes, and Miscellaneous Glazing Materials: As specified in Section 088000, "Glazing."
   1. Elastomeric Glazing Sealants: ASTM C 920.
      a. Color: As selected by Architect from manufacturer's full range.

B. Joint Sealants: As specified in Section 079200, "Joint Sealants."

2.5 HARDWARE FOR GLASS INSTALLATION

A. Hardware: Heavy duty spider fittings.
   1. Products: Subject to compliance with requirements, provide products from one of the following, or approved equal:
      a. CHMI Custom Hardware Manufacturing, Inc.
      b. Laurence, C. R. Co., Inc..
   2. Material and Finish: Brushed stainless.

B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

C. Gaskets and Wedges: Manufacturer's standard, compatible with decorative glass type indicated.

D. Anchors and Inserts: Provide devices as required for hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.6 DECORATIVE-GLASS FABRICATION

A. Fabricate decorative glass and provide other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written recommendations of product manufacturer and with referenced glazing standard.

B. Edge Finishing: Fabricate finished edges to produce smooth, polished edges without chips, scratches, or warps.
   1. Finished Edge: Clean cut or flat grind vertical edges of butt-glazed lites in a manner that produces square edges with slight kerfs.
   2. Edge-Finished Glass Adhesive: Clear, nonyellowing, as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine decorative-glass framing members, with Installer present, for compliance with the following:
   1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
   2. Minimum required face or edge clearances.
   3. Effective sealing between joints of decorative-glass framing members.

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

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate orientation of outer surfaces as indicated on Drawings. Label or mark units as needed so that surface orientation is readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 INSTALLATION

A. Set decorative-glass units in each series true in line with uniform orientation, pattern, draw, bow, and similar characteristics.

B. Set glass lites with proper orientation so that each outer surface faces the direction indicated on Drawings.

C. Set decorative glass in locations indicated on Drawings. Install glass with hardware and accessories according to hardware manufacturer's written instructions. Attach hardware securely to mounting surfaces and building structure.

D. Set decorative glass in locations indicated on Drawings.

3.4 GLAZING, GENERAL

A. Decorative Glass: Install glazing as specified in Section 088000, "Glazing."

B. Comply with combined written instructions of manufacturers of gaskets, glass, sealants, tapes, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publications.

C. Adjust glazing channel dimensions during installation as required by Project conditions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

D. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

E. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

F. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

G. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

H. Provide spacers for glass lites where length plus width is more than 50 inches (1270 mm).
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances, and to comply with system performance requirements.
   2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

I. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.5 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels and between glass-to-glass joints to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants smooth.

3.6 CLEANING AND PROTECTION

A. Protect decorative glass from damage immediately after installation by attaching crossed streamers to framing and held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088113

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on exterior substrates visible behind the canopy soffit glass as indicated on the Drawings.

B. Related Requirements:
1. Division 05 Sections for shop priming of metal substrates with primers specified in these Sections.

1.3 DEFINITIONS

A. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
1. Label each Sample for location and application area.

C. Product List: For each product indicated, include the following:
1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
3. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 QUALITY ASSURANCE

A. Source Limitations: Use only one manufacturer's materials throughout the Project, except for special finishes as specified, and specialty items such as shellac, oils, waxes, and cleaners.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
1. Benjamin Moore & Co.
2. Diamond Vogel Paints.
3. ICI Paints.
4. Kwal Paint.
5. PPG Architectural Finishes, Inc.
6. Pratt & Lambert.
7. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:
1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

D. Colors: As indicated on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer but not less than the following:
   1. SSPC-SP 2, "Hand Tool Cleaning."

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

G. Existing Substrates:
   1. Prepare all surfaces for repainting in accordance with MPI Repainting Manual requirements. Refer to the MPI Repainting Manual in regard to specific requirements for the following:
      a. structural steel and miscellaneous metals.
      b. steel exposed to high heat.
      c. galvanized and zinc coated metal.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
   1. Use applicators and techniques suited for paint and substrate indicated.
      a. Spray application of paints will be permitted on wall surfaces provided the application is by airless-type spray equipment, and provided the application by spray is followed by a roller. Roller shall thoroughly work paint into pores for complete surface coverage. Conventional paint spray equipment will be permitted on metal door frames, metal doors, and other metal fabrications.
   2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
   3. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
   1. Contractor shall touch up and restore painted surfaces damaged by testing.

2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. New Steel Substrates:
1. Water-Based Light Industrial Coating System:
a. Prime Coat: Shop primer specified in Division 05 Section where substrate is specified. Spot prime existing painted surfaces as required by the manufacturer.
b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
c. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5), MPI #163. Basis-of-Design Product: Sherwin-Williams Pro Industrial DTM Semi-Gloss B66W01151, or approved equal product from approved manufacturer.

END OF SECTION 099113

SECTION 099623 - GRAFFITI RESISTANT COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Permanent anti-graffiti coating system.

B. Related Sections:
1. Section 071900 – Water Repellents for unpainted surfaces.

1.2 QUALITY ASSURANCE

A. Contractor Qualifications: Installer shall be a firm with not less than three years of successful experience in application of coatings of type required on substrates similar to those of this project. The firm shall be approved by the manufacturer of the coating for installation of their product.

B. Manufacturer's representative shall inspect substrate conditions including alkalinity and moisture content. Obtain written approval from representative before proceeding with work.

C. Meets ASTM-D7089 with Cleanability at least Level 2.

D. Meets ASTM-D6578 with Cleanability at least Level 9.

1.3 SUBMITTALS

A. Instructions: Provide instructions bearing manufacturer's name, coating type, and recommended installation procedures. Provide methods and material instruction for graffiti removal. Include adhesive-backed graffiti removal instruction label suitable for application to interior surface.

B. Submit proof of purchase (Invoice of materials purchased) and proof of delivery of coating materials.

C. Manufacturer’s Warranty: Submit one copy of manufacturer's warranty for specified materials.

D. Field Sample: Apply graffiti resistant coating to field mock-up sample representing exterior wall surface to be coated. Apply coating system over a minimum 3 ft x 3 ft test area and test removal of applied spray paint in presence of Construction Manager for approval using removal methods recommended by the manufacturer.

1.4 EXTRA MATERIALS

A. Furnish the following to building owner upon completion of the Project.
1. Provide four containers of removal products as recommended by the manufacturer accompanied by removal instructions.

1.5 DELIVERY, STORAGE AND HANDLING

A. Paint orders to the manufacturer or supplier shall identify the store number, location, and address of project. Contractor shall require a record keeping account be established and maintained by the paint supplier which records graffiti resistant paint type, brand, and quantity purchased, for the specific project.

B. Deliver coating materials in sealed original labeled containers, bearing manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and/or reducing.

C. Store materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F in ventilated area and as required by manufacturer's instructions.

D. Prevent fire hazards and spontaneous combustion.

1.6 WARRANTY

A. Provide manufacturers written warranty guaranteeing effective graffiti removal for not less than 10 years and warrant that treated surfaces can be effectively and repeatedly cleaned of graffiti without damage or loss of effectiveness of the graffiti resistant coating. Manufacturer shall, for the duration of the warranty period, guarantee replacement of product where graffiti removal has shown to be ineffective.

1.7 PROJECT CONDITIONS

A. Environmental Requirements: Follow manufacturer's recommendations for temperature range in which coating may be applied.

PART 2 - PRODUCTS

2.1 GRAFFITI RESISTANT COATING

A. Graffiti resistant coating shall be a clear, non-sacrificial graffiti resistant coating which provides protection for exterior vertical surfaces from permanent graffiti staining and damage caused by spray paint and marking pens. Coating shall be suitable for application to painted and unpainted surfaces including concrete and metals. Product shall be of type such that recoating with the underlying paint is possible without removal of the graffiti resistant coating. Product shall be a coating that dries clear, non-yellowing, with a low luster.
   1. Basis-of-Design: Provide basis-of-design product or approved equal product:
      a. VandlGuard Non-Sacrificial Graffiti Coating Zero Gloss (Three Coats) by Rainguard International, Newport Beach, CA 888-765-7070.

B. Micro-Seal Water Repellant (One Coat) by Rainguard International, Newport Beach, CA 888-765-7070, or approved equal. (For first coat on unpainted concrete surfaces): As specified in Section 071900.

C. Graffiti Remover: VandlClean Super graffiti remover by Rainguard International, Newport Beach, CA 888-7657070, or approved eequal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify all surfaces are ready to receive coating in accordance with manufacturer’s printed requirements. Beginning of installation indicates acceptance of substrate.

B. Unpainted Concrete: Verify water repellant has been applied in accordance with Section 071900 to new or non-painted concrete surfaces prior to the application of the anti-graffiti coating.

3.2 PREPARATION

A. Surface shall be free of dirt, dust, contaminants such as curing compounds, hardeners, bond breakers, and form release. Allow painted surfaces to cure properly. Do not water blast painted surfaces. Assure surfaces are clean and dry.

B. Mask or otherwise protect adjacent surfaces not scheduled to receive coating. If applied on unscheduled surfaces such as glass, remove immediately, by approved method.

C. Protect landscaping, property, and vehicles from over spray and drift.

3.3 APPLICATION

A. Apply coating in accordance with manufacturer's published instructions.

B. Application Rate: Apply each coat at the manufacturers published application rate.

3.4 SURFACES TO BE COATED

A. Apply to exterior vertical surfaces including concrete walls and aluminum wall panels as applicable.

3.5 MAINTENANCE

A. Deliver cleaning products to Store Manager for storage and subsequent use for graffiti removal. Apply cleaning instructions label to interior wall location as directed by the Construction Manager.

3.6 FIELD QUALITY CONTROL:

A. Verify application rate by periodic on-site inspection and calculation of area covered compared to consumption of coating material used. Document inspections showing total area covered and number and volume of coating containers used.

END OF SECTION 099623

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SECTION 10 1400 - SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Channel characters.
   2. Surface-mounted display case.

1.3 DEFINITIONS

A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for signs.
   1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
   2. Provide message list, typestyles, graphic elements and layout for each sign.

C. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
   1. Channel Characters: Full-size Samples of each type of dimensional character (letter, number, and graphic element).

D. Sign Schedule: Use same designations indicated on Drawings.

E. Qualification Data: For Installer and fabricator.

F. Maintenance Data: For signs to include in maintenance manuals.

G. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

C. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION

A. Coordinate placement of anchorage devices with templates for installing signs.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Deterioration of metal finishes beyond normal weathering.
      b. Deterioration of embedded graphic image colors and sign lamination.
   2. Warranty Period: Twenty years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.

B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.

2.2 CHANNEL CHARACTERS

A. Subject to compliance with requirements, provide aluminum channel letters and reverse lighted channel letters as shown on Drawings as manufactured by one of the following:
   1. A. R. K. Ramos.
   2. ASI-Modulex, Inc.
   3. Innerface Sign Systems, Inc.
   4. Nelson-Harkins Industries.
   5. Gemini, Incorporated.
   6. Signworks.

B. Channel Characters: Provide letters with square-cut, smooth, eased edges. Comply with the following requirements:
   1. Material: Aluminum 3/8 inch thick.
      a. Finish: Painted.
      b. Color: As selected by Architect from manufacturer's full range.
   2. Mounting: Projected with concealed noncorroding studs for substrates encountered.

C. Channel Character Sign Schedule:
   1. Sign Type: Pillar Signage (Reverse Lighted Channel Letters).
      a. Character Size: As indicated.
      b. Text: As indicated, varies per station location.
      c. Location: As indicated.
      d. Font Style: Trade Gothic LT Standard Bold Condensed No. 20.
   2. Sign Type: Front Canopy Signage (Channel Letters).
      a. Character Size: As indicated.
      b. Text/Message: As indicated.
      c. Location: As indicated.
      d. Font Style: ORBT Primary Logo, color version as indicated in the ORBT Brand Standards, 2017, v5.
   3. Sign Type: Side Canopy Signage (Channel Letters).
      a. Character Size: As indicated.
      b. Text/Message: As indicated, varies per station location.
      c. Location: As indicated.
      d. Font Style: Trade Gothic LT Standard Bold Condensed No. 20

2.3 ACCESSORIES

A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.4 FABRICATION

A. General: Provide manufacturer's standard signs of configurations indicated.
   1. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
   2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
   3. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
   4. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.5 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

A. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
   1. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm), medium gloss.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Verify that items, including anchor inserts, are sized and located to accommodate signs.

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

3.2 INSTALLATION

A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
   1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.

B. Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.
   1. Projected Mounting: Mount characters at projection distance from wall surface indicated.

3.3 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 10 1400

SECTION 101700 - TELEPHONE SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Pedestal-mounted telephone enclosures.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each telephone specialty.
1. Include plans, elevations, sections, and mounting details.
2. Include diagrams for power, signal, and control wiring.
3. Include setting drawings, templates, and installation instructions for anchor bolts and other anchorages and for power and communication services. Indicate concealment of embedded items from view.

C. Samples for Initial Selection: For each type of exposed finish.
1. Include Samples of hardware and accessories involving color or finish selection.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of telephone specialty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For telephone specialties to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDJ's "2010 ADA Standards for Accessible Design" and ICC A117.1 for telephone specialties.

2.2 PEDESTAL-MOUNTED TELEPHONE ENCLOSURES

A. Pedestal-Mounted Telephone Enclosure: Individual enclosure, constructed for outdoor exposure.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Basis-of-Design Product or approved equal.
      a. Basis-of-Design: Rath Security, Sussex, Wisconsin, Pedestal Phone Model #2100-PPC2, 5 feet-8 inches tall, with integrated Discrete View Camera; Color to be determined by Architect from manufacturer’s standard color selection.
   2. Pedestal: Steel pedestal for floor mounting with concealed mounting bolts. Include matching metal covers with tamper-resistant fasteners for access to service components.
      a. Service Entry: Through pedestal base.
      b. Steel Finish: Baked enamel or powder coat.
      c. Color: As selected by Architect from manufacturer's full range.
      d. Service Access: Access panel shall be located in an easily accessible location on pedestal based on location of telephone enclosure on site.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for proper locations of power and communication connections and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. Install telephone specialties according to manufacturer's written instructions. Install units level and plumb, with tight joints and uniform appearance, and free of deformation and surface and finish irregularities.

B. Install telephone specialties after other finishing operations, including painting, have been completed.

3.3 ADJUSTING

A. Adjust hardware and moving components to operate smoothly, and lubricate as recommended by manufacturer.

B. Switches: Adjust field-adjustable switches and devices to properly control operation of electrically powered components.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain telephone-booth doors and interfaces.

END OF SECTION 101700

SECTION 12 9300 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Seating.
   2. Trash receptacles.

B. Products furnished, but not installed under this Section, include anchor bolts to be installed in paving.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
   1. Size: Not less than 6-inch- (152-mm-) long linear components and 4-inch- (102-mm-) square sheet components.

C. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

D. Material Certificates: For site furnishings, signed by manufacturers.

E. Maintenance Data: For site furnishings to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of site furnishing through one source from a single manufacturer.

1.5 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Trash Receptacle Inner Containers: 5 full-size units for each size indicated,.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated; free of surface blemishes and complying with the following:
   1. Rolled or Cold-Finished Bars, Rods, and Wire: ASTM B 211 (ASTM B 211M).
   2. Extruded Bars, Rods, Wire, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
   3. Structural Pipe and Tube: ASTM B 429.
   4. Sheet and Plate: ASTM B 209 (ASTM B 209M).
   5. Castings: ASTM B 26/B 26M.

B. Steel and Iron: Free of surface blemishes and complying with the following:
   1. Plates, Shapes, and Bars: ASTM A 36/A 36M.
   2. Steel Pipe: Standard-weight steel pipe complying with ASTM A 53, or electric-resistance-welded pipe complying with ASTM A 135.
   3. Tubing: Cold-formed steel tubing complying with ASTM A 500.
   4. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A 513, or steel tubing fabricated from steel complying with ASTM A 1011/A 1011M and complying with dimensional tolerances in ASTM A 500; zinc coated internally and externally.
   5. Sheet: Commercial steel sheet complying with ASTM A 1011/A 1011M.

C. Anchors, Fasteners, Fittings, and Hardware: Manufacturer's epoxy coated, commercial quality, tamperproof, vandal and theft resistant , concealed, recessed, and capped or plugged.
   1. Angle Anchors: For inconspicuously bolting legs of site furnishings to on-grade substrate; per manufacturer’s recommendation.

D. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107; recommended in writing by manufacturer, for exterior applications.

E. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.

F. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:
   1. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. (0.27 kg/sq. m) of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than 0.3 mil (0.0076 mm) thick.
   2. Hot-Dip Galvanizing: According to ASTM A 123/A 123M, ASTM A 153/A 153M, or ASTM A 924/A 924M.

2.2 BENCH SEATING

A. Basis-of-Design Product: Manufacturer: Forms+Surfaces. Product: Tecno RS Seating System, backless with armrests between each seat with support legs, ground supported. Finish: Powder coated cast aluminum. Subject to compliance with requirements, provide Basis-of-Design product, or a comparable product by one of the following:
   1. A & T Iron Works, Inc.
   2. BCI Burke Company, LLC.
   3. BRP Enterprises, Inc.
   4. Canterbury International.
   5. Columbia Cascade Company.
   6. Country Casual.
   7. Creative Pipe, Inc.
   8. DuMor Inc.
   9. FairWeather Site Furnishings.
   10. Fibrex Group Inc. (The).
   11. GameTime; a PlayCore, Inc. Company.
   12. Gardenside, Ltd.
   13. Henderson Recreation Equipment Ltd.
   14. Howell Equipment Co.
   15. Huntco Supply, LLC.
   16. Kay Park Recreation.
   17. Keystone Ridge Designs, Inc.

18. Kingsley~Bate, Ltd.
19. Landscape Forms.
20. Landscape Structures Inc.
21. L. A. Steelcraft.
22. Madrax; A T. L. Graber Co.
23. Maglin Furniture Systems Ltd.
24. Miracle Recreation Equipment Co.; a division of PlayPower, Inc.
25. Playworld Systems, Inc.
26. Recreation Creations, Inc.
27. RPI Designs.
28. Sitecraft.
29. Smith & Hawken.
30. SportsPlay Equipment, Inc.
31. Urban Accessories, Inc.
32. Victor Stanley, Inc.
33. Wausau Tile, Inc.; Metal-Form Division.
34. Weatherend Estate Furniture.

2.3 TRASH RECEPTACLES

A. Basis-of-Design Product: Manufacturer: Witt Outdoor. Product: Expanded metal receptacles, EcP-52 standard model with #555 dome top. Capacity: 48 gallons. Finish: As selected by Architect from manufacturer's standard powder coat finish colors. Subject to compliance with requirements, provide Basis-of-Design Product, or a comparable product by one of the following:
1. BCI Burke Company, LLC.
2. BRP Enterprises, Inc.
3. Canterbury International.
4. Columbia Cascade Company.
5. Country Casual.
6. Creative Pipe, Inc.
7. DuMor Inc.
8. Fiberglass Engineering Company.
9. Fibrex Group Inc. (The).
10. Forms+Surfaces.
11. GameTime; a PlayCore, Inc. Company.
12. Gardenside Ltd.
13. Henderson Recreation Equipment Ltd.
14. Huntco Supply, LLC.
15. Kay Park Recreation.
16. Keystone Ridge Designs, Inc.
17. Landscape Forms.
18. Landscape Structures Inc.
19. L. A. Steelcraft.
20. Maglin Furniture Systems Ltd.
21. Miracle Recreation Equipment Co.; a division of PlayPower, Inc.
22. Playworld Systems, Inc.
23. Recreation Creations, Inc.
24. RPI Designs.
25. Sitecraft.
26. Smith & Hawken.
27. Urban Accessories, Inc.
28. Victor Stanley, Inc.
29. Wausau Tile, Inc.; Metal-Form Division.

2.4 FABRICATION

A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

D. Preservative-Treated Wood Components: Complete fabrication of treated items before treatment if possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces.

E. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.

F. Factory Assembly: Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.5 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.7 STEEL AND GALVANIZED STEEL FINISHES

A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.

D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

3.3 CLEANING

A. After completing site furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION 12 9300

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SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Sleeves.
2. Stack-sleeve fittings.
3. Sleeve-seal systems.
4. Sleeve-seal fittings.
5. Grout.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. Galvanized-Steel-Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.2 STACK-SLEEVE FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
1. Smith, Jay R. Mfg. Co.
2. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.

B. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.
1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. Metraflex Company (The).
4. Pipeline Seal and Insulator, Inc.
5. Proco Products, Inc.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Stainless steel.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Presealed Systems.

B. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.5 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch (25-mm) annular clear space between piping and concrete slabs and walls.
1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.
a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level.
3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.
   1. Cut sleeves to length for mounting flush with both surfaces.
   2. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.
   3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 07 9200, JOINT SEALANTS.

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 07 8413 PENETRATION FIRESTOPPING.

3.2 STACK-SLEEVE-FITTING INSTALLATION

A. Install stack-sleeve fittings in new slabs as slabs are constructed.
   1. Install fittings that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.
   2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 07 6200, SHEET METAL FLASHING AND TRIM.
   3. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level.
   4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
   5. Using grout, seal the space around outside of stack-sleeve fittings.

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:
   1. Exterior Concrete Walls above Grade:
      a. Cast-iron wall sleeves; Galvanized-steel wall sleeves, galvanized-steel-pipe sleeves or sleeve-seal fittings.
   2. Exterior Concrete Walls below Grade:
      a. Cast-iron wall sleeves with sleeve-seal system.

3. Concrete Slabs-on-Grade:
   a. Cast-iron wall sleeves with sleeve-seal system.
4. Concrete Slabs above Grade:

   a. Galvanized-steel-pipe sleeves, stack-sleeve fittings or sleeve-seal fittings.
5. Interior Partitions:
   a. Galvanized-steel-pipe sleeves.

END OF SECTION 220517

SECTION 220518 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Escutcheons.
2. Floor plates.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated and rough-brass finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.

C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

D. Split-Casting Brass Type: With polished, chrome-plated and rough-brass finish and with concealed hinge and setscrew.

E. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed hinge, and spring-clip fasteners.

2.2 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

B. Split-Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.
1. Escutcheons for New Piping:
   a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
   b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.
   c. Insulated Piping: One-piece, stamped-steel type.

d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
f. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish.
g. Bare Piping in Equipment Rooms: One-piece, cast-brass type with rough-brass finish.

2. Escutcheons for Existing Piping:
   a. Chrome-Plated Piping: Split-casting brass type with polished, chrome-plated finish.
   b. Insulated Piping: Split-plate, stamped-steel type with concealed hinge.
   c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-casting brass type with polished, chrome-plated finish.
   d. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-casting brass type with polished, chrome-plated finish.
   e. Bare Piping in Unfinished Service Spaces: Split-casting brass type with rough-brass finish.
   f. Bare Piping in Equipment Rooms: Split-casting brass type with rough-brass finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
   1. New Piping: One-piece, floor-plate type.
   2. Existing Piping: Split-casting, floor-plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 220518

SECTION 220519 - METERS AND GAGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Dial-type pressure gages.
2. Gage attachments.

B. Related Sections:
1. Section 22 1116, DOMESTIC WATER PIPING, for water meters inside the building.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of meter and gage, from manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 PRESSURE GAGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. AMETEK, Inc.; U.S. Gauge.
b. Ashcroft Inc.
c. Ernst Flow Industries.
d. Flo Fab Inc.
e. Marsh Bellofram.
f. Miljoco Corporation.
g. Noshok.
h. Palmer Wahl Instrumentation Group.
i. REOTEMP Instrument Corporation.
j. Tel-Tru Manufacturing Company.
k. Trerice, H. O. Co.
l. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
m. Weiss Instruments, Inc.
n. WIKA Instrument Corporation - USA.
o. Winters Instruments - U.S.

2. Standard: ASME B40.100.
3. Case: Sealed type(s); cast aluminum or drawn steel; 4-1/2-inch (114-mm) nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2 (DN 8 or DN 15), ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi (kPa).
8. Pointer: Dark-colored metal.
9. Window: Glass or plastic.
10. Ring: Metal.
11. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.2 GAGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with NPS 1/4 or NPS 1/2 (DN 8 or DN 15) , ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.

B. Valves: Brass or stainless-steel needle, with NPS 1/4 or NPS 1/2 (DN 8 or DN 15), ASME B1.20.1 pipe threads.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

B. Install valve and snubber in piping for each pressure gage for fluids.

C. Install pressure gages in the following locations:
1. Building water service entrance into building.
2. Inlet and outlet of each pressure-reducing valve.

3.2 CONNECTIONS

A. Install gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

3.3 ADJUSTING

A. Adjust faces of meters and gages to proper angle for best visibility.

3.4 PRESSURE-GAGE SCHEDULE

A. Pressure gages at suction and discharge of each domestic water pump shall be the following:
1. Sealed, direct -mounted, metal case.

3.5 PRESSURE-GAGE SCALE-RANGE SCHEDULE

A. Scale Range for Water Service Piping: 0 to 160 psi (0 to 1100 kPa).

END OF SECTION 220519

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.
2. Encasement for piping.

1.3 ACTION SUBMITTALS

A. Product Data: For transition fittings and dielectric fittings.

1.4 INFORMATIONAL SUBMITTALS

A. System purging and disinfecting activities report.

B. Field quality-control reports.

1.5 FIELD CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
1. Notify Construction Manager in writing no fewer than seven days in advance of proposed interruption of water service.
2. Do not interrupt water service without Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Potable-water piping and components shall comply with NSF 14 and NSF 61. Plastic piping components shall be marked with "NSF-pw."

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L (ASTM B 88M, Type B) water tube, drawn temper.

B. Soft Copper Tube: ASTM B 88, Type K (ASTM B 88M, Type A) and ASTM B 88, Type L (ASTM B 88M, Type B) water tube, annealed temper.

C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

F. Copper Unions:
1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

G. Appurtenances for Grooved-End Copper Tubing:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
   a. Anvil International.
   b. Shurjoint Piping Products.
   c. Victaulic Company.
2. Bronze Fittings for Grooved-End, Copper Tubing: ASTM B 75 (ASTM B 75M) copper tube or ASTM B 584 bronze castings.
3. Mechanical Couplings for Grooved-End Copper Tubing:
   a. Copper-tube dimensions and design similar to AWWA C606.
   b. Ferrous housing sections.
   c. EPDM-rubber gaskets suitable for hot and cold water.
   d. Bolts and nuts.
   e. Minimum Pressure Rating: 300 psig (2070 kPa).

2.3 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe:
1. AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Standard-Pattern, Mechanical-Joint Fittings:
1. AWWA C110/A21.10, ductile or gray iron.
2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

C. Compact-Pattern, Mechanical-Joint Fittings:
1. AWWA C153/A21.53, ductile iron.
2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.4 ENCASEMENT FOR PIPING

A. Standard: Polyethylene ASTM A 674 or AWWA C105/A21.5.

B. Form: Sheet or tube.

2.5 TRANSITION FITTINGS

A. General Requirements:
1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

C. Sleeve-Type Transition Coupling: AWWA C219.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Cascade Waterworks Manufacturing.
      b. Dresser, Inc.; Piping Specialties Products.
      c. Ford Meter Box Company, Inc. (The).
      d. JCM Industries.
      e. Romac Industries, Inc.
      f. Smith-Blair, Inc.; a Sensus company.
      g. Viking Johnson.

2.6 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Capitol Manufacturing Company; member of the Phoenix Forge Group.
      b. Central Plastics Company.
      c. Hart Industries International, Inc.
      d. Jomar International.
      e. Matco-Norca.
      f. McDonald, A. Y. Mfg. Co.
      g. Watts; a division of Watts Water Technologies, Inc.
      h. Wilkins; a Zurn company.
   2. Standard: ASSE 1079.
   3. Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C).
   4. End Connections: Solder-joint copper alloy and threaded ferrous.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.

D. Install underground copper tube in PE encasement according to ASTM A 674 or AWWA C105/A21.5.

E. Install shutoff valve immediately upstream of each dielectric fitting.

F. Install water-pressure-reducing valves downstream from shutoff valves.

G. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

H. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

I. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

J. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

K. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

L. Install piping to permit valve servicing.

M. Install unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

N. Install piping free of sags and bends.

O. Install fittings for changes in direction and branch connections.

P. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

Q. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

R. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

S. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

F. Joint Construction for Grooved-End Copper Tubing: Make joints according to AWWA C606. Roll groove ends of tubes. Lubricate and install gasket over ends of tubes or tube and fitting. Install coupling housing sections over gasket with keys seated in tubing grooves. Install and tighten housing bolts.

G. Joint Construction for Grooved-End, Ductile-Iron Piping: Make joints according to AWWA C606. Cut round-bottom grooves in ends of pipe at gasket-seat dimension required for specified (flexible or rigid) joint. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections over gasket with keys seated in piping grooves. Install and tighten housing bolts.

H. Joint Construction for Grooved-End Steel Piping: Make joints according to AWWA C606. Roll groove ends of pipe as specified. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections over gasket with keys seated in piping grooves. Install and tighten housing bolts.

I. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

J. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.3 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:
1. Fittings for NPS 1-1/2 (DN 40) and Smaller: Fitting-type coupling.
2. Fittings for NPS 2 (DN 50) and Larger: Sleeve-type coupling.

3.4 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 (DN 50) and Smaller: Use dielectric couplings.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:
   a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
   b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
3. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support vertical piping and tubing at base and at each floor.

C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch (10 mm).

D. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 3/4 (DN 20) and Smaller: 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
4. NPS 2-1/2 (DN 65): 108 inches (2700 mm) with 1/2-inch (13-mm) rod.

E. Install supports for vertical copper tubing every 10 feet (3 m).

F. Install supports for vertical steel piping every 15 feet (4.5 m).

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
   1. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.

3.7 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."

B. Label pressure piping with system operating pressure.

3.8 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   1. Piping Inspections:
      a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
      b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
         1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
         2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
      c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
      d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
   2. Piping Tests:
      a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
      b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
      c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
      d. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
      e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
      f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.9 ADJUSTING

A. Perform the following adjustments before operation:
1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Remove and clean strainer screens. Close drain valves and replace drain plugs.
4. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.10 CLEANING

A. Clean and disinfect potable domestic water piping as follows:
1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
b. Fill and isolate system according to either of the following:
1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.
2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.
c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
d. Repeat procedures if biological examination shows contamination.
e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Clean non-potable domestic water piping as follows:
1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:
a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.11 PIPING SCHEDULE

A. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

B. Fitting Option: Brazed joints may be used on aboveground copper tubing.

C. Under-building-slab, domestic water, building-service piping, NPS 3 (DN 80) and smaller , shall be the following:
1. Soft copper tube, ASTM B 88, Type K (ASTM B 88M, Type A) ; wrought-copper, solder-joint fittings; and brazed joints.

D. Under-building-slab, domestic water, building-service piping, NPS 4 to NPS 8 (DN 100 to DN 200) and larger , shall be the following:
   1. Mechanical-joint, ductile-iron pipe; standard- or compact-pattern, mechanical-joint fittings; and mechanical joints.

E. Under-building-slab, domestic water piping, NPS 2 (DN 50) and smaller, shall be the following:
   1. Soft copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); wrought-copper, solder-joint fittings; and brazed joints.

F. Aboveground domestic water piping, NPS 2 (DN 50) and smaller, shall be the following:
   1. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); wrought-copper, solder-joint fittings; and soldered joints.

G. Aboveground domestic water piping, NPS 2-1/2 to NPS 4 (DN 65 to DN 100) , shall be the following:
   1. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); wrought-copper, solder-joint fittings; and soldered joints.
   2. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); grooved-joint, copper-tube appurtenances; and grooved joints.

H. Aboveground domestic water piping, NPS 5 to NPS 8 (DN 125 to DN 200) , shall be one of the following:
   1. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); cast- or wrought-copper, solder-joint fittings; and brazed joints.
   2. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); grooved-joint, copper-tube appurtenances; and grooved joints.

3.12 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
   1. Shutoff Duty: Use ball or gate valves for piping NPS 2 (DN 50) and smaller. Use butterfly, ball, or gate valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
   2. Drain Duty: Hose-end drain valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

C. Iron grooved-end valves may be used with grooved-end piping.

END OF SECTION 221116

SECTION 221413 - BUILDING STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Pipe, tube, and fittings.
2. Specialty pipe fittings.
3. Encasement for underground metal piping.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
1. Storm Drainage Piping: 10-foot head of water (30 kPa).

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Seismic Qualification Certificates: For storm drainage piping, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service and Extra Heavy classes. Products that do not bear the trademark of CISPI shall submit current IAPMO/UPC and ICC-ES certifications.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. AB&I
      b. Charlotte Pipe and Foundry
      c. Tyler Pipe

B. Gaskets: ASTM C 564, rubber.

C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301. Products that do not bear the trademark of CISPI shall submit current IAPMO/UPC and ICC-ES certifications.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. AB&I
      b. Charlotte Pipe and Foundry
      c. Tyler Pipe

B. Hubless-Piping Couplings:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
      a. ANACO-Husky.
      b. Fernco Inc.
      c. Mission Rubber Company; a division of MCP Industries, Inc.
      d. Stant.
      e. Tyler Pipe.
   2. Standards: ASTM C 1277 or CISPI 310, bearing NSF Trademark.
   3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

C. Cast-Iron, Hubless-Piping Couplings:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
      a. MG Piping Products Company.
   2. Standard: ASTM A-1056.
   3. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.4 GALVANIZED-STEEL PIPE AND FITTINGS

A. Galvanized-Steel Pipe: ASTM A 53/A 53M, Type E, Standard Weight. Include square-cut-grooved or threaded ends matching joining method.

B. Cast-Iron Drainage Fittings: ASME B16.12 threaded.

C. Steel-Pipe Pressure Fittings:
1. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106/A 106M, Schedule 40, seamless steel pipe. Include ends matching joining method.
2. Malleable-Iron Unions: ASME B16.39; Class 150; hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface; and female threaded ends.
3. Gray-Iron, Threaded Fittings: ASME B16.4, Class 125, standard pattern.

D. Cast-Iron Flanges: ASME B16.1, Class 125.
1. Flange Gasket Materials: ASME B16.21, full-face, flat, nonmetallic, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.
2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

E. Grooved-Joint, Galvanized-Steel-Pipe Appurtenances:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Anvil International.
b. Grinnell Mechanical Products.
c. Shurjoint Piping Products.
d. Victaulic Company.
2. Galvanized, Grooved-End Fittings for Galvanized-Steel Piping: ASTM A 536 ductile-iron castings, ASTM A 47/A 47M malleable-iron castings, ASTM A 234/A 234M forged-steel fittings, or ASTM A 106/A 106M steel pipes with dimensions matching ASTM A 53/A 53M steel pipe, and complying with AWWA C606 for grooved ends.
3. Grooved Mechanical Couplings for Galvanized-Steel Piping: ASTM F 1476, Type I. Include ferrous housing sections with continuous curved keys; EPDM-rubber gasket suitable for hot and cold water; and bolts and nuts.

2.5 SPECIALTY PIPE FITTINGS

A. Transition Couplings:
1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified-piping-system fitting.
3. Unshielded, Nonpressure Transition Couplings:
a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1) Dallas Specialty & Mfg. Co.
2) Fernco Inc.
3) Mission Rubber Company; a division of MCP Industries, Inc.
4) Plastic Oddities; a division of Diverse Corporate Technologies, Inc.
b. Standard: ASTM C 1173.
c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
d. Sleeve Materials:
1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
4. Shielded, Nonpressure Transition Couplings:
a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1) Cascade Waterworks Mfg. Co.
2) Mission Rubber Company; a division of MCP Industries, Inc.

b. Standard: ASTM C 1460.
c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

5. Pressure Transition Couplings:
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) Cascade Waterworks Mfg. Co.
      2) Dresser, Inc.
      3) EBAA Iron, Inc.
      4) Ford Meter Box Company, Inc. (The)
      5) JCM Industries, Inc.
      6) Romac Industries, Inc.
      7) Smith-Blair, Inc.; a Sensus company.
      8) Viking Johnson; c/o Mueller Co.
   b. Standard: AWWA C219.
   c. Description: Metal, sleeve-type couplings same size as, with pressure rating at least equal to and ends compatible with, pipes to be joined.
   d. Center-Sleeve Material: Manufacturer's standard.
   e. Gasket Material: Natural or synthetic rubber.
   f. Metal Component Finish: Corrosion-resistant coating or material.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations from layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

D. Install piping to permit valve servicing.

E. Install piping at indicated slopes.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Install piping to allow application of insulation.

I. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

J. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

K. Install storm drainage piping at the following minimum slopes unless otherwise indicated:
   1. Building Storm Drain: 2 percent downward in direction of flow for piping NPS 3 (DN 80) and smaller; 1 percent downward in direction of flow for piping NPS 4 (DN 100) and larger.
   2. Horizontal Storm-Drainage Piping: 2 percent downward in direction of flow.

L. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

M. Install steel piping according to applicable plumbing code.

N. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

O. Plumbing Specialties:
   1. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers in storm drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping. Comply with requirements for cleanouts specified in Division 22 Section "Storm Drainage Piping Specialties."

P. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

Q. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

R. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

S. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Hub-and-Spigot, Cast-Iron Soil Piping Calked Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.

C. Hubless, Cast-Iron Soil Piping Coupled Joints: Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fittings. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:
1. Install transition couplings at joints of piping with small differences in OD's.
2. In Drainage Piping: Unshielded, nonpressure transition couplings.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger and support devices and installation.
1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
3. Vertical Piping: MSS Type 8 or Type 42, clamps.
4. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
5. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support horizontal piping and tubing within 12 inches (300 mm) of each fitting and coupling.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.

E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 3 (DN 80): 60 inches (1500 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 and NPS 5 (DN 100 and DN 125): 60 inches (1500 mm) with 5/8-inch (16-mm) rod.
4. Spacing for 10-foot (3-m) pipe lengths may be increased to 10 feet (3 m). Spacing for fittings is limited to 60 inches (1500 mm).

F. Install supports for vertical cast-iron soil piping every 15 feet (4.5 m).

G. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/4 (DN 32): 84 inches (2100 mm) with 3/8-inch (10-mm) rod.
2. NPS 1-1/2 (DN 40): 108 inches (2700 mm) with 3/8-inch (10-mm) rod.
3. NPS 2 (DN 50): 10 feet (3 m) with 3/8-inch (10-mm) rod.
4. NPS 2-1/2 (DN 65): 11 feet (3.4 m) with 1/2-inch (13-mm) rod.
5. NPS 3 (DN 80): 12 feet (3.7 m) with 1/2-inch (13-mm) rod.
6. NPS 4 and NPS 5 (DN 100 and DN 125): 12 feet (3.7 m) with 5/8-inch (16-mm) rod.

H. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.

C. Connect storm drainage piping to roof drains and storm drainage specialties.
   1. Install test tees (wall cleanouts) in conductors near floor, and floor cleanouts with cover flush with floor.
   2. Comply with requirements for drains specified in Division 22 Section "Storm Drainage Piping Specialties."

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections according to the following unless otherwise indicated:
   1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
   2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.7 FIELD QUALITY CONTROL

A. Test storm drainage piping according to procedures as follows:
   1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.
   2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
   3. Test Procedure: Test storm drainage piping on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts until completion of inspection, water level must not drop. Inspect joints for leaks.
   4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
   5. Prepare reports for tests and required corrective action.

3.8 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.9 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground storm drainage piping NPS 6 (DN 150) and smaller shall be the following:
   1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
   2. Hubless, cast-iron soil pipe and fittings; hubless-piping couplings; and coupled joints.
   3. Galvanized-steel pipe, drainage fittings, and threaded joints.
   4. Copper DWV tube, copper drainage fittings, and soldered joints.

C. Underground storm drainage piping NPS 6 (DN 150) and smaller shall be the following:
   1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
   2. Hubless, cast-iron soil pipe and fittings; heavy-duty, hubless-piping couplings; and coupled joints.

END OF SECTION 221413

SECTION 221423 - STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Roof drains.
2. Cleanouts.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 METAL ROOF DRAINS

A. Cast-Iron, General-Purpose Roof Drains RD-:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Josam Company.
   b. Smith, Jay R. Mfg. Co.
   c. Tyler Pipe.
   d. Watts Water Technologies, Inc.
   e. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.6.4, for general-purpose roof drains.
3. Body Material: Cast iron.
4. Dimension of Body: 8- to 12-inch (203- to 305-mm) diameter.
5. Combination Flashing Ring and Gravel Stop: As required.
6. Flow-Control Weirs: As required.
7. Outlet: Bottom.
8. Extension Collars: As required.
9. Underdeck Clamp: As required.
10. Expansion Joint: As required.
11. Sump Receiver Plate: As required.
12. Dome Material: Cast iron.
13. Wire Mesh: Not required.
14. Perforated Gravel Guard: Not required.
15. Vandal-Proof Dome: Not required.

2.2 CLEANOUTS

A. Wall Cleanouts:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Josam Company.
      b. Smith, Jay R. Mfg. Co.
      c. Tyler Pipe.
      d. Watts Water Technologies, Inc.
      e. Zurn Plumbing Products Group; Specification Drainage Operation.
   2. Standard: ASME A112.36.2M, for cleanouts. Include wall access.
   3. Size: Same as connected drainage piping.
   4. Body Material: Hub-and-spigot, cast-iron soil-pipe T-branch or hubless, cast-iron soil-pipe test tee as required to match connected piping.
   5. Closure: Countersunk or raised-head, drilled-and-threaded brass plug.
   6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
   7. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.

2.3 FLASHING MATERIALS

A. Flashing materials shall be as specified in Division 07.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions. Roofing materials are specified in Division 07 Sections.
   1. Install flashing collar or flange of roof drain to prevent leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
   2. Install expansion joints, if indicated, in roof drain outlets.
   3. Position roof drains for easy access and maintenance.

B. Install cleanouts in aboveground piping and building drain piping according to the following instructions unless otherwise indicated:
   1. Use cleanouts the same size as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
   2. Locate cleanouts at each change in direction of piping greater than 45 degrees.
   3. Locate cleanouts at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.
   4. Locate cleanouts at base of each vertical soil and waste stack.

C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall. Cleanouts in the resilient tile floors, quarry tile and ceramic tile floors shall be provided with square top covers recessed for tile insertion. In the carpeted areas, carpet cleanout markers shall be provided. Two way cleanouts shall be provided where indicated on Drawings and at every building exit.

D. Install wall cleanouts in vertical conductors. Install access door in wall if indicated.

E. Install sleeve flashing device with each conductor passing through floors with waterproof membrane.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

3.3 FLASHING INSTALLATION

A. Flashing installation shall be as specified in Division 07.

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221423

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SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:
1. Section 260523 "Control-Voltage Electrical Power Cables" for control systems communications cables and Classes 1, 2 and 3 control cables.
2. Section 271500 "Communications Horizontal Cabling" for cabling used for voice and data circuits.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Alcan Products Corporation; Alcan Cable Division.
2. American Insulated Wire Corp.; a Leviton Company.
3. General Cable Corporation.
4. Senator Wire & Cable Company.
5. Southwire Company.

B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN/THWN-2 and Type XHHW-2.

D. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for Type SO with ground wire.

2.2 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. AFC Cable Systems, Inc.
2. Hubbell Power Systems, Inc.
3. O-Z/Gedney; EGS Electrical Group LLC.
4. 3M; Electrical Products Division.

5. Tyco Electronics Corp.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger, except VFC cable, which shall be extra flexible stranded.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type XHHW-2, single conductors in raceway.

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, and Walls, Type THHN/THWN-2, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

E. Exposed Branch Circuits: Type THHN/THWN-2, single conductors in raceway.

F. Branch Circuits Concealed in Ceilings and Walls: Type THHN/THWN-2, single conductors in raceway.

G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

H. VFC Output Circuits: Type XHHW-2 in metal conduit.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.
   2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

B. Test and Inspection Reports: Prepare a written report to record the following:
   1. Procedures used.
   2. Results that comply with requirements.
   3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 260519

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SECTION 260523 - CONTROL-VOLTAGE ELECTRICAL POWER CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Multimode optical-fiber cabling.
2. UTP cabling.
3. RS-485 cabling.
4. Low-voltage control cabling.
5. Control-circuit conductors.
6. Identification products.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.

C. Plenum: A space forming part of the air distribution system to which one or more air ducts are connected. An air duct is a passageway, other than a plenum, for transporting air to or from heating, ventilating, or air-conditioning equipment.

D. RCDD: Registered Communications Distribution Designer.

E. UTP: Unshielded twisted pair.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.

B. Source quality-control reports.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.
1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 PERFORMANCE REQUIREMENTS

A. Flame Travel and Smoke Density in Plenums: As determined by testing identical products according to NFPA 262 by a qualified testing agency. Identify products for installation in plenums with appropriate markings of applicable testing agency.
   1. Flame Travel Distance: 60 inches (1520 mm) or less.
   2. Peak Optical Smoke Density: 0.5 or less.
   3. Average Optical Smoke Density: 0.15 or less.

B. Flame Travel and Smoke Density for Riser Cables in Non-Plenum Building Spaces: As determined by testing identical products according to UL 1666.

C. Flame Travel and Smoke Density for Cables in Non-Riser Applications and Non-Plenum Building Spaces: As determined by testing identical products according to UL 1685.

2.3 BACKBOARDS

A. Description: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements for plywood backing panels in Section 061000 "Rough Carpentry."

B. Painting: Paint plywood on all sides and edges with flat latex paint. Comply with requirements in Section 099123 "Interior Painting."

2.4 OPTICAL-FIBER CABLE

A. Description: Multimode, 50/125-micrometer, 24-fiber, nonconductive, tight-buffer, optical-fiber cable.
   1. Comply with ICEA S-83-596 for mechanical properties.
   2. Comply with TIA-568-C.3 for performance specifications.
   3. Comply with TIA-492AAAA-B for detailed specifications.
   4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
      a. Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262.
      b. Riser Rated, Nonconductive: Type OFNR or Type OFNP, complying with UL 1666.
      c. General Purpose, Nonconductive: Type OFN or Type OFNG.
      d. Plenum Rated, Conductive: Type OFCP or Type OFNP, complying with NFPA 262.
      e. Riser Rated, Conductive: Type OFCR; or Type OFNR, Type OFCP, or Type OFNP; complying with UL 1666 and ICEA S-103-701.
      f. General Purpose, Conductive: Type OFC or Type OFCG; or Type OFC, Type OFN, Type OFCG, Type OFNG, Type OFCR, Type OFNR, Type OFCP, or Type OFNP.
   5. Conductive cable shall be steel-armored type.

B. Jacket:
   1. Jacket Color: Aqua for 50/125-micrometer cable.
   2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-C.
   3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).

2.5 OPTICAL-FIBER CABLE HARDWARE

A. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.
   1. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.

B. Patch Cords: Factory-made, dual-fiber cables in 36-inch (900-mm) lengths.

C. Cable Connecting Hardware:
   1. Comply with Optical-Fiber Connector Intermateability Standards (FOCIS) specifications of TIA-604-2-B, TIA-604-3-B, and TIA/EIA-604-12. Comply with TIA-568-C.3.
   2. Quick-connect, simplex and duplex, Type SC or Type ST connectors. Insertion loss of not more than 0.75 dB.
   3. Type SFF connectors may be used in termination racks, panels, and equipment packages.

2.6 UTP CABLE

A. Description: 100-ohm, four-pair UTP, 25-pair UTP covered with a thermoplastic jacket.
   1. Comply with ICEA S-90-661 for mechanical properties of Category 5e cables.
   2. Comply with ICEA S-102-700 for mechanical properties of Category 6 cables.
   3. Comply with TIA-568-C.1 for performance specifications.
   4. Comply with TIA-568-C.2, Category 6.
   5. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with NEMA WC 66, and NFPA 70 for the following types:
      a. Communications, Plenum Rated: Type CMP complying with UL 1685 or Type CMP in listed plenum communications raceway.
      b. Communications, Riser Rated: Type CMR complying with UL 1666 and ICEA S-103-701.
      c. Communications, General Purpose: Type CM or Type CMG; or Type CM, Type CMG, Type CMP, or Type CMR in listed communications raceways.
      d. Communications, Limited Purpose: Type CMX; or Type CM, Type CMG, Type CMP, or Type CMR.

2.7 UTP CABLE HARDWARE

A. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-C.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.

B. Connecting Blocks: 110-style IDC for Category 6. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.

C. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.
   1. Number of Terminals per Field: One for each conductor in assigned cables.

D. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
   1. Number of Jacks per Field: One for each four-pair conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria.

E. Jacks and Jack Assemblies: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-C.1.

F. Patch Cords: Factory-made, four-pair cables in 36-inch (900-mm) lengths; terminated with eight-position modular plug at each end.
   1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.

G. Faceplates:
   1. Metal Faceplate: Stainless steel, complying with requirements in Section 262726 "Wiring Devices."
   2. For use with snap-in jacks accommodating any combination of UTP, optical-fiber, and coaxial work area cords.
      a. Flush-mounted jacks, positioning the cord at a 45-degree angle.

H. Legend:
   1. Factory labeled by silk-screening or engraving for stainless steel faceplates.

2.8 RS-485 CABLE

A. Standard Cable: NFPA 70, Type CMG.
   1. Paired, two pairs, twisted, No. 22 AWG, stranded (7x30) tinned-copper conductors.
   2. PVC insulation.
   3. Unshielded.
   4. PVC jacket.
   5. Flame Resistance: Comply with UL 1685.

B. Plenum-Rated Cable: NFPA 70, Type CMP.
   1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned-copper conductors.
   2. Fluorinated ethylene propylene insulation.
   3. Unshielded.
   4. Fluorinated ethylene propylene jacket.
   5. Flame Resistance: NFPA 262.

2.9 LOW-VOLTAGE CONTROL CABLE

A. Paired Cable: NFPA 70, Type CMG.
   1. Multi-pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
   2. PVC insulation.
   3. Unshielded.
   4. PVC jacket.
   5. Flame Resistance: Comply with UL 1685.

B. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.
   1. Multi-pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
   2. PVC insulation.
   3. Unshielded.
   4. PVC jacket.
   5. Flame Resistance: Comply with NFPA 262.

2.10 CONTROL-CIRCUIT CONDUCTORS

A. Class 1 Control Circuits: Stranded copper, Type THHN-2-THWN-2, in raceway, complying with UL 44.

B. Class 2 Control Circuits: Stranded copper, Type THHN-2-THWN-2, in raceway, complying with UL 44.

C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type THHN-2-THWN-2, in raceway, complying with UL 44.

D. Class 2 Control Circuits and Class 3 Remote-Control and Signal Circuits That Supply Critical Circuits: Circuit Integrity (CI) cable.
   1. Smoke control signaling and control circuits.

2.11 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate cables.

B. Factory test UTP cables according to TIA-568-C.2.

C. Factory test optical-fiber cables according to TIA-568-C.3.

D. Cable will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Test cables on receipt at Project site.
   1. Test optical-fiber cable to determine the continuity of the strand end to end. Use optical-fiber flashlight.
   2. Test optical-fiber cable on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector; include the loss value of each. Retain test data and include the record in maintenance data.
   3. Test each pair of UTP cable for open and short circuits.

3.2 INSTALLATION OF RACEWAYS AND BOXES

A. Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems" for raceway selection and installation requirements for boxes, conduits, and wireways as supplemented or modified in this Section.
   1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.
   2. Outlet boxes for optical-fiber cables shall be no smaller than 4 inches (102 mm) square by 2-1/8 inches (53 mm) deep with extension ring sized to bring edge of ring to within 1/8 inch (3.1 mm) of the finished wall surface.
   3. Flexible metal conduit shall not be used.

B. Comply with TIA-569-B for pull-box sizing and length of conduit and number of bends between pull points.

C. Install manufactured conduit sweeps and long-radius elbows if possible.

D. Raceway Installation in Equipment Rooms:
   1. Position conduit ends adjacent to a corner on backboard if a single piece of plywood is installed, or in the corner of the room if multiple sheets of plywood are installed around perimeter walls of the room.
   2. Install cable trays to route cables if conduits cannot be located in these positions.
   3. Secure conduits to backboard if entering the room from overhead.
   4. Extend conduits 3 inches (75 mm) above finished floor.
   5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

E. Backboards: Install backboards with 96-inch (2440-mm) dimension vertical. Butt adjacent sheets tightly and form smooth gap-free corners and joints.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1 and NFPA 70.

B. General Requirements for Cabling:
1. Comply with TIA-568-C Series of standards.
2. Terminate all conductors and optical fibers; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
3. Cables may not be spliced.
4. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
5. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems" and Ch. 6, "Optical Fiber Structured Cabling Systems." Install lacing bars and distribution spools.
6. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
7. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.
8. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems" and Ch. 6, "Optical Fiber Structured Cabling Systems." Monitor cable pull tensions.
9. Support: Do not allow cables to lay on removable ceiling tiles.
10. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.

C. UTP Cable Installation:
1. Comply with TIA-568-C.2.
2. Install termination hardware as specified in Section 271500 "Communications Horizontal Cabling" unless otherwise indicated.
3. Do not untwist UTP cables more than 1/2 inch (12 mm) at the point of termination to maintain cable geometry.

D. Installation of Control-Circuit Conductors:
1. Install wiring in raceways. Comply with requirements specified in Section 260533 "Raceways and Boxes for Electrical Systems."

E. Optical-Fiber Cable Installation:
1. Comply with TIA-568-C.3.
2. Terminate cable on connecting hardware that is rack or cabinet mounted.

F. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 30 inches (760 mm) apart.
3. Cable shall not be run through or on structural members or in contact with pipes, ducts, or other potentially damaging items. Do not run cables between structural members and corrugated panels.

G. Installation of Cable Routed Exposed under Raised Floors:
1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.

3. Below each feed point, neatly coil a minimum of 72 inches (1830 mm) of cable in a coil not less than 12 inches (305 mm) in diameter.

H. Separation from EMI Sources:
1. Comply with BICSI TDMM and TIA-569-B recommendations for separating unshielded copper voice and data communications cable from potential EMI sources including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
   a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
   b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 12 inches (305 mm).
   c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 24 inches (600 mm).
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
   a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
   b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
   c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 12 inches (305 mm).
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
   a. Electrical Equipment or Circuit Rating Less Than 2 kVA: No requirement.
   b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 3 inches (75 mm).
   c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or 5 HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.4 REMOVAL OF CONDUCTORS AND CABLES

A. Remove abandoned conductors and cables. Abandoned conductors and cables are those installed that are not terminated at equipment and are not identified for future use with a tag.

3.5 CONTROL-CIRCUIT CONDUCTORS

A. Minimum Conductor Sizes:
1. Class 1 remote-control and signal circuits; No 14 AWG.
2. Class 2 low-energy, remote-control, and signal circuits; No. 16 AWG.
3. Class 3 low-energy, remote-control, alarm, and signal circuits; No 12 AWG.

3.6 GROUNDING

A. For data communication wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Bonding and Grounding (Earthing)" Chapter.

B. For low-voltage control wiring and cabling, comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

3.7 IDENTIFICATION

A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Identify data and communications system components, wiring, and cabling according to TIA-606-A; label printers shall use label stocks, laminating adhesives, and inks complying with UL 969.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections:
   1. Visually inspect UTP and optical-fiber cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1.
   2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
   3. Test UTP cabling for direct-current loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not after cross-connection.
      a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
   4. Optical-Fiber Cable Tests:
      a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.0. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
      b. Link End-to-End Attenuation Tests:
         1) Multimode Link Measurements: Test at 850 or 1300 nm in one direction according to TIA/EIA-526-14-A, Method B, One Reference Jumper.
         2) Attenuation test results for links shall be less than 2.0 dB.

D. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.

E. End-to-end cabling will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION 260523

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes grounding and bonding systems and equipment.

B. Section includes grounding and bonding systems and equipment, plus the following special applications:
1. Underground distribution grounding.
2. Ground bonding common with lightning protection system.
3. Foundation steel electrodes.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. As-Built Data: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
1. Test wells.
2. Ground rods.
3. Ground rings.
4. Grounding arrangements and connections for separately derived systems.

B. Qualification Data: For testing agency and testing agency's field supervisor.

C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.
1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
a. Instructions for periodic testing and inspection of grounding features at test wells or ground rings based on NFPA 70B.
1) Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
2) Include recommended testing intervals.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.
1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:
1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.3 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.4 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel;3/4 inch by 10 feet (19 mm by 3 m).

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.
1. Bury at least 24 inches (600 mm) below grade.
2. Duct-Bank Grounding Conductor: Bury 12 inches (300 mm) above duct bank when indicated as part of duct-bank installation.

C. Grounding Bus: Install in electrical equipment enclosure, and elsewhere as indicated.
1. Install bus horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

D. Conductor Terminations and Connections:
1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING SEPARATELY DERIVED SYSTEMS

A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

3.4 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches (100 mm) will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches (50 mm) above to 6 inches (150 mm) below concrete. Seal floor opening with waterproof, nonshrink grout.

C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.

D. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches (150 mm) from the foundation.

3.5 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Flexible raceway runs.
6. Armored and metal-clad cable runs.
7. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in panel to equipment grounding bar terminal on busway.

C. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.6 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

C. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.
1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Section 260543 "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches (300 mm) deep, with cover.
1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.

2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

F. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

G. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.

H. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.

I. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel column, extending around the perimeter of building.
1. Install tinned-copper conductor not less than No. 2/0 AWG for ground ring and for taps to building steel.
2. Bury ground ring not less than 24 inches (600 mm) from building's foundation.

J. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; use a minimum of 20 feet (6 m) of bare copper conductor not smaller than No. 4 AWG.
1. If concrete foundation is less than 20 feet (6 m) long, coil excess conductor within base of foundation.
2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and Inspections:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells. Make tests at ground rods before any conductors are connected.
   a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
   b. Perform tests by fall-of-potential method according to IEEE 81.
4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

E. Grounding system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

G. Report measured ground resistances that exceed the following values:
   1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less:10ohms.
   2. Manhole Grounds: 10 ohms.

H. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
a. Hangers.
b. Steel slotted support systems.
c. Nonmetallic support systems.
d. Trapeze hangers.
e. Clamps.
f. Turnbuckles.
g. Sockets.
h. Eye nuts.
i. Saddles.
j. Brackets.
2. Include rated capacities and furnished specialties and accessories.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. For fabrication and installation details for electrical hangers and support systems.
1. Trapeze hangers. Include product data for components.
2. Steel slotted-channel systems.
3. Nonmetallic slotted-channel systems.
4. Equipment supports.
5. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

C. Delegated-Design Submittal: For hangers and supports for electrical systems.
1. Include design calculations and details of trapeze hangers.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Suspended ceiling components.
2. Structural members to which hangers and supports will be attached.
3. Items penetrating finished ceiling, including the following:
a. Lighting fixtures.

b. Speakers.
c. Access panels.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design hanger and support system.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame Rating: Class 1.
2. Self-extinguishing according to ASTM D 635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.
1. Material: Galvanized steel.
2. Channel Width: 1-5/8 inches (41.25 mm).
3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
4. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
6. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
7. Channel Dimensions: Selected for applicable load criteria.

B. Aluminum Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.
1. Channel Width: 1-5/8 inches (41.25 mm).
2. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
3. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
4. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
5. Channel Dimensions: Selected for applicable load criteria.

C. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with minimum 13/32-inch- (10-mm-) diameter holes at a maximum of 8 inches (200 mm) o.c., in at least one surface.
1. Channel Width: 1-5/8 inches (41.25 mm).
2. Fittings and Accessories: Products provided by channel and angle manufacturer and designed for use with those items.
3. Fitting and Accessory Materials: Same as those for channels and angles, except metal items may be stainless steel.
4. Rated Strength: Selected to suit applicable load criteria.
5. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

D. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.

F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
   1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
   4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
   5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
   6. Toggle Bolts: Stainless-steel springhead type.
   7. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems unless requirements in this Section are stricter.

B. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMTs, IMCs, and RMCs as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least25 percent in future without exceeding specified design load limits.
   1. Secure raceways and cables to these supports with two-bolt conduit clamps.

E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMTs, IMCs, and RMCs may be supported by openings through structure members, according to NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete."

C. Anchor equipment to concrete base as follows:
1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
   1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touchup: Comply with requirements in Section 099113 "Exterior Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

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SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetal wireways and auxiliary gutters.
5. Surface raceways.
6. Boxes, enclosures, and cabinets.
7. Handholes and boxes for exterior underground cabling.

B. Related Requirements:
1. Section 260543 "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.

1.3 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

B. Qualification Data: For professional engineer.

C. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. GRC: Comply with ANSI C80.1 and UL 6.

C. ARC: Comply with ANSI C80.5 and UL 6A.

D. IMC: Comply with ANSI C80.6 and UL 1242.

E. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit, IMC.
1. Comply with NEMA RN 1.
2. Coating Thickness: 0.040 inch (1 mm), minimum.

F. EMT: Comply with ANSI C80.3 and UL 797.

G. FMC: Comply with UL 1; zinc-coated steel.

H. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

I. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:
   a. Material: Steel.
   b. Type: Setscrew.
3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

J. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ENT: Comply with NEMA TC 13 and UL 1653.

C. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

D. LFNC: Comply with UL 1660.

E. Rigid HDPE: Comply with UL 651A.

F. Continuous HDPE: Comply with UL 651B.

G. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D 3485.

H. RTRC: Comply with UL 1684A and NEMA TC 14.

I. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

J. Fittings for LFNC: Comply with UL 514B.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 3R unless otherwise indicated, and sized according to NFPA 70.
   1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

C. Wireway Covers: Screw-cover type unless otherwise indicated.

D. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

A. Listing and Labeling: Nonmetallic wireways and auxiliary gutters shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Description: Fiberglass polyester, extruded and fabricated to required size and shape, without holes or knockouts. Cover shall be gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections shall be flanged and have stainless-steel screws and oil-resistant gaskets.

C. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.

2.5 SURFACE RACEWAYS

A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect.

C. Surface Nonmetallic Raceways: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors. Product shall comply with UL 94 V-0 requirements for self-extinguishing characteristics.

D. Tele-Power Poles:
   1. Material: Galvanized steel with ivory baked-enamel finish.
   2. Fittings and Accessories: Dividers, end caps, covers, cutouts, wiring harnesses, devices, mounting materials, and other fittings shall match and mate with tele-power pole as required for complete system.

2.6 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

E. Metal Floor Boxes:
1. Material: Cast metal.
2. Type: Fully adjustable.
3. Shape: Rectangular.
4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

F. Nonmetallic Floor Boxes: Nonadjustable, round.
1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.

H. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

I. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

J. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

K. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).

L. Gangable boxes are allowed.

M. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 3R with continuous-hinge cover with flush latch unless otherwise indicated.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Fiberglass.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

N. Cabinets:
1. NEMA 250, Type 3R galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.7 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. General Requirements for Handholes and Boxes:
1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.

2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.
1. Standard: Comply with SCTE 77.
2. Configuration: Designed for flush burial with closed bottom unless otherwise indicated.
3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
5. Cover Legend: Molded lettering, "ELECTRIC.".
6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
7. Handholes 12 Inches Wide by 24 Inches Long (300 mm Wide by 600 mm Long) and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

C. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with frame and covers of polymer concrete.
1. Standard: Comply with SCTE 77.
2. Color of Frame and Cover: Gray.
3. Configuration: Designed for flush burial with closed bottom unless otherwise indicated.
4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, "ELECTRIC.".
7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
8. Handholes 12 Inches Wide by 24 Inches Long (300 mm Wide by 600 mm Long) Insert dimensions and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.8 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
1. Tests of materials shall be performed by an independent testing agency.
2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012 and traceable to NIST standards.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed Conduit: GRC.
2. Concealed Conduit, Aboveground: EMT.
3. Underground Conduit: RNC, Type EPC-40-PVC.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Minimum Raceway Size: 3/4-inch (21-mm).

C. Raceway Fittings: Compatible with raceways and suitable for use and location.
   1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
   2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
   3. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
   4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

D. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

E. Install surface raceways only where indicated on Drawings.

F. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inches (300 mm) of enclosures to which attached.

I. Raceways Embedded in Slabs:
   1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot (3-m) intervals.
   2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
   3. Arrange raceways to keep a minimum of 2 inches (50 mm) of concrete cover in all directions.
   4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
   5. Change from ENT to GRC before rising above floor.

J. Stub-ups to Above Recessed Ceilings:
   1. Use EMT, IMC, or RMC for raceways.

2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

L. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

M. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

N. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

O. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

P. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

Q. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

R. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

S. Surface Raceways:
1. Install surface raceway with a minimum 2-inch (50-mm) radius control at bend points.
2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

T. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

U. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

V. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

W. Expansion-Joint Fittings:
1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C) and that has straight-run length that exceeds 25 feet (7.6 m).

Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).

2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
   a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
   b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
   c. Attics: 135 deg F (75 deg C) temperature change.
3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

X. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
   1. Use LFMC in damp or wet locations subject to severe physical damage.
   2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

Y. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

Z. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

AA. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

BB. Locate boxes so that cover or plate will not span different building finishes.

CC. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

DD. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

EE. Set metal floor boxes level and flush with finished floor surface.

FF. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:
   1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter.
   2. Install backfill as specified in Section 312000 "Earth Moving."

3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
   a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete for a minimum of 12 inches (300 mm) on each side of the coupling.
   b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
5. Warning Planks: Bury warning planks approximately 12 inches (300 mm) above direct-buried conduits but a minimum of 6 inches (150 mm) below grade. Align planks along centerline of conduit.
6. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.5-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch (25 mm) above finished grade.

D. Install handholes with bottom below frost line, 48 inches below grade.

E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.

F. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.
   1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
   2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:
1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

F. Sleeves for Rectangular Openings:
1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:
   a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
   b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Stainless steel.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

2.4 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
   1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
   1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
      a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
      b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
   2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
   3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.

4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544

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SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels, including arc-flash warning labels.
8. Miscellaneous identification products.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.

B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

D. Delegated-Design Submittal: For arc-flash hazard study.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:
1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

B. Raceways and Cables Carrying Circuits at More Than 600 V:
1. Black letters on an orange field.
2. Legend: "DANGER - CONCEALED HIGH VOLTAGE WIRING."

C. Warning labels and signs shall include, but are not limited to, the following legends:
1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.3 LABELS

A. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

B. Snap-Around Labels for Raceways and Cables Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters of raceways they identify, and that stay in place by gripping action.

C. Self-Adhesive Labels:
1. Preprinted, 3-mil- (0.08-mm-) thick, polyester flexible label with acrylic pressure-sensitive adhesive.
   a. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized to fit the cable and raceway diameter, such that the clear shield overlaps the entire printed legend.
2. Polyester, thermal, transfer-printed, 3-mil- (0.08-mm-) thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
   a. Nominal Size: 3.5-by-5-inch (76-by-127-mm).
3. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.4 BANDS AND TUBES:

A. Snap-Around, Color-Coding Bands for Raceways and Cables: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches (50 mm) long, with diameters sized to suit diameters of raceways or cables they identify, and that stay in place by gripping action.

B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameters of and shrunk to fit firmly around cables they identify. Full shrink recovery occurs at a maximum of 200 deg F (93 deg C). Comply with UL 224.

2.5 TAPES AND STENCILS:

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide; compounded for outdoor use.

C. Tape and Stencil for Raceways Carrying Circuits 600 V or Less: 4-inch- (100-mm-) wide black stripes on 10-inch (250-mm) centers placed diagonally over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stop stripes at legends.

D. Floor Marking Tape: 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, withblack and white stripes and clear vinyl overlay.

E. Underground-Line Warning Tape
1. Tape:
   a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
   b. Printing on tape shall be permanent and shall not be damaged by burial operations.
   c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.
2. Color and Printing:
   a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
   b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".
   c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".
3. Tag: Type I:
   a. Pigmented polyolefin, bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
   b. Width: 3 inches (75 mm).
   c. Thickness: 4 mils (0.1 mm).
   d. Weight: 18.5 lb/1000 sq. ft. (9.0 kg/100 sq. m).
   e. Tensile according to ASTM D 882: 30 lbf (133.4 N) and 2500 psi (17.2 MPa).
4. Tag: Type II:
   a. Multilayer laminate, consisting of high-density polyethylene scrim coated with pigmented polyolefin; bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
   b. Width: 3 inches (75-mm).
   c. Thickness: 12 mils (0.3 mm).
   d. Weight: 36.1 lb/1000 sq. ft. (17.6 kg/100 sq. m).
   e. Tensile according to ASTM D 882: 400 lbf (1780 N) and 11,500 psi (79.2 MPa).
5. Tag: Type ID:
   a. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
   b. Width: 3 inches (75 mm).
   c. Overall Thickness: 5 mils (0.125 mm).
   d. Foil Core Thickness: 0.35 mil (0.00889 mm).
   e. Weight: 28 lb/1000 sq. ft. (13.7 kg/100 sq. m).
   f. Tensile according to ASTM D 882: 70 lbf (311.3 N) and 4600 psi (31.7 MPa).
6. Tag: Type IID:
   a. Reinforced, detectable three-layer laminate, consisting of a printed pigmented woven scrim, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
   b. Width: 3 inches (75-mm).
   c. Overall Thickness: 8 mils (0.2 mm).
   d. Foil Core Thickness: 0.35 mil (0.00889 mm).
   e. Weight: 34 lb/1000 sq. ft. (16.6 kg/100 sq. m).
   f. Tensile according to ASTM D 882: 300 lbf (1334 N) and 12,500 psi (86.1 MPa).

F. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch (25 mm).

2.6 TAGS

A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.

B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.015 inch (0.38 mm) thick, color-coded for phase and voltage level, with factory screened permanent designations; punched for use with self-locking cable tie fastener.

C. Write-On Tags:
1. Polyester Tags: 0.010 inch (0.25 mm) thick, with corrosion-resistant grommet and cable tie for attachment to raceway, conductor, or cable.
2. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
3. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.7 SIGNS

A. Baked-Enamel Signs:
1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal Size: 7 by 10 inches (180 by 250 mm).

B. Metal-Backed Butyrate Signs:
1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch (1-mm) galvanized-steel backing and with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal Size: 10 by 14 inches (250 by 360 mm).

C. Laminated Acrylic or Melamine Plastic Signs:
1. Engraved legend.
2. Thickness:
a. For signs up to 20 sq. inches (129 sq. cm), minimum 1/16-inch- (1.6-mm-).
b. For signs larger than 20 sq. inches (129 sq. cm), 1/8 inch (3.2 mm) thick.
c. Engraved legend with black letters on white face.
d. Punched or drilled for mechanical fasteners.
e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.8 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, Type 6/6 nylon.
1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 deg F (23 deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: Black, except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, Type 6/6 nylon.
1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 deg F (23 deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).

4. Color: Black.

C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, self-locking.
1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 deg F (23 deg C) according to ASTM D 638: 7000 psi (48.2 MPa).
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
5. Color: Black.

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

G. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

H. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

I. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

J. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

K. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

L. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.

3.3 IDENTIFICATION SCHEDULE

A. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil 4-inch- (100-mm-) wide black stripes on 10-inch (250-mm) centers over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch- (75-mm-) high black letters on 20-inch (500-mm) centers. Stop stripes at legends. Apply stripes to the following finished surfaces:
   1. Floor surface directly above conduits running beneath and within 12 inches (300 mm) of a floor that is in contact with earth or is framed above unexcavated space.
   2. Wall surfaces directly external to raceways concealed within wall.
   3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.

B. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Self-adhesive vinyl labels. Install labels at 10-foot (3-m) maximum intervals.

C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
   1. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.
      a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
      b. Colors for 208/120-V Circuits:
         1) Phase A: Black.
         2) Phase B: Red.
         3) Phase C: Blue.
      c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

D. Power-Circuit Conductor Identification, More Than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use write-on tags.

E. Install instructional sign, including the color code for grounded and ungrounded conductors using adhesive-film-type labels.

F. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use write-on tags with the conductor or cable designation, origin, and destination.

G. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive, self-laminating polyester labels with the conductor designation.

H. Conductors To Be Extended in the Future: Attach marker tape to conductors and list source.

I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
   1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
   2. Use system of marker-tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
   3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

J. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
   1. Limit use of underground-line warning tape to direct-buried cables.
   2. Install underground-line warning tape for direct-buried cables and cables in raceways.

K. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

L. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
   1. Comply with 29 CFR 1910.145.
   2. Identify system voltage with black letters on an orange background.
   3. Apply to exterior of door, cover, or other access.
   4. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
      a. Power-transfer switches.
      b. Controls with external control power connections.

M. Arc Flash Warning Labeling: Self-adhesive thermal transfer vinyl labels.
   1. Comply with NFPA 70E and ANSI Z535.4.
   2. Comply with Section 260574 "Overcurrent Protective Device Arc-Flash Study" requirements for arc-flash warning labels.

N. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

O. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm unless equipment is provided with its own identification.
   1. Labeling Instructions:
      a. Indoor Equipment: Self-adhesive, self-laminating label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
      b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
      c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
      d. Unless labels are provided with self-adhesive means of attachment, fasten them with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment To Be Labeled:
   a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of a self-adhesive, engraved, laminated acrylic or melamine label.
   b. Enclosures and electrical cabinets.
   c. Access doors and panels for concealed electrical items.
   d. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
   e. Enclosed switches.
   f. Enclosed circuit breakers.
   g. Enclosed controllers.
   h. Push-button stations.
   i. Contactors.
   j. Remote-controlled switches, dimmer modules, and control devices.
   k. Monitoring and control equipment.

END OF SECTION 260553

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Time switches.
2. Photoelectric switches.
3. Lighting contactors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:
1. Show installation details.
2. Interconnection diagrams showing field-installed wiring.
3. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and elevations, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Suspended ceiling components.
2. Structural members to which equipment will be attached.
3. Items penetrating finished ceiling, including the following:
   a. Luminaires.
   b. Speakers.
   c. Access panels.
   d. Control modules.

B. Field quality-control reports.

C. Sample Warranty: For manufacturer's warranties.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in operation and maintenance manuals.

B. Software and Firmware Operational Documentation:
1. Software operating and upgrade manuals.
2. Program Software Backup: On USB media. Provide names, versions, and website addresses for locations of installed software.
3. Device address list.
4. Printout of software application and graphic screens.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace lighting control devices that fail(s) in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Faulty operation of lighting control software.
      b. Faulty operation of lighting control devices.
   2. Warranty Period: Two year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TIME SWITCHES

A. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.
   1. Listed and labeled as defined in NFPA 70 and marked for intended location and application.
   2. Contact Configuration: SPST or DPST.
   3. Contact Rating: 20-A ballast load, 120-/240-V ac.
   4. Programs: Two on-off set points on a 24-hour schedule, allowing different set points for each day of the week and an annual holiday schedule that overrides the weekly operation on holidays.
   5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program on selected channels.
   6. Astronomic Time: All channels.
   7. Automatic daylight savings time changeover.
   8. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.

2.2 OUTDOOR PHOTOELECTRIC SWITCHES

A. Description: Solid state, with SPST dry contacts rated for 1000 W incandescent or1800 VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A, and compatible with ballasts and LED lamps.
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lux), with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of the photocell to prevent fixed light sources from causing turn-off.
   3. Time Delay: Fifteen-second minimum, to prevent false operation.
   4. Surge Protection: Metal-oxide varistor.
   5. Mounting: Twist lock complies with NEMA C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.
   6. Failure Mode: Luminaire stays ON.

B. Description: Solid state, with SPST dry contacts rated for 1000 W incandescent or 1800 VA inductive, to operate connected load, complying with UL 773, and compatible with CFL and LED lamps.
   1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lux), with an adjustment for turn-on and turn-off levels within that range.
   3. Time Delay: Thirty-second minimum, to prevent false operation.
   4. Lightning Arrester: Air-gap type.
   5. Mounting: Twist lock complying with NEMA C136.10, with base.
   6. Failure Mode: Luminaire stays ON.

C. Description: Solid state; one set of NO dry contacts rated for 24 V ac at 1 A, to operate connected load, complying with UL 773, and compatible withluminaire.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lux), with an adjustment for turn-on and turn-off levels within that range.
3. Time Delay: Thirty-second minimum, to prevent false operation.
4. Mounting: 1/2-inch (13-mm) threaded male conduit.
5. Failure Mode: Luminaire stays ON.
6. Power Pack: Dry contacts rated for 20-A LED load at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
   a. LED status lights to indicate load status.
   b. Plenum rated.
7. Power Pack: Digital controller capable of accepting three RJ45 inputs with twooutputs rated for 20-A LED load at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, Class 2 power source, as defined by NFPA 70.
   a. With integral current monitoring
   b. Compatible with digital addressable lighting interface.
   c. Plenum rated.

2.3 LIGHTING CONTACTORS

A. Description: Electrically operated and mechanically held, combination-type lighting contactors with fusible switch, complying with NEMA ICS 2 and UL 508.
   1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less THD of normal load current).
   2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
   3. Enclosure: Comply with NEMA 250.
   4. Provide with control and pilot devices matching the NEMA type specified for the enclosure.

B. Interface with DDC System for HVAC: Provide hardware interface to enable the DDC system for HVAC to monitor and control lighting contactors.
   1. Monitoring: On-off status.
   2. Control: On-off operation.

2.4 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.

B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.

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

3.2 CONTACTOR INSTALLATION

A. Comply with NECA 1.

B. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.3 WIRING INSTALLATION

A. Comply with NECA 1.

B. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch (13 mm).

C. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.

D. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.

E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.4 IDENTIFICATION

A. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."
   1. Identify controlled circuits in lighting contactors.
   2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

B. Label time switches and contactors with a unique designation.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate lighting control devices and perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
   1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Lighting control devices will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.6 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 260923

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SECTION 260936 - MODULAR DIMMING CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Wall-box, multiscene, modular dimming controls.
2. Multipreset modular dimming controls.

1.3 DEFINITIONS

A. BAS: Building automation system.

B. Fade Rate: The time it takes each zone to arrive at the next scene, dependent on the degree of change in lighting level.

C. Low Voltage: As defined in NFPA 70, the term for circuits and equipment operating at less than 50 V or for remote-control, signaling, and power-limited circuits.

D. RFI: Radio-frequency interference.

E. Scene: The lighting effect created by adjusting several zones of lighting to the desired intensity.

F. SCR: Silicon-controlled rectifier.

G. Zone: A luminaire or group of luminaires controlled simultaneously as a single entity. Also known as a "channel."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. For modular dimming controls; include elevation, dimensions, features, characteristics, ratings, and labels.
2. Device plates and plate color and material.
3. Ballast and lamp combinations compatible with dimmers.
4. Sound data including results of operational tests of central dimming controls.
5. Operational documentation for software and firmware.

B. Shop Drawings: Detail assemblies of standard components, custom assembled for specific application on Project. Indicate dimensions, weights, arrangement of components, and clearance and access requirements.
1. Include elevation views of front panels of control and indicating devices and control stations.
2. Include diagrams for power, signal, and control wiring.
3. Address Drawing: Reflected ceiling plan and floor plans, showing connected luminaires, address for each luminaire, and luminaire groups. Base plans on construction plans, using the same legend, symbols, and schedules.
4. Point List and Data Bus Load: Summary list of all control devices, sensors, ballasts, and other loads. Include percentage of rated connected load and device addresses.

5. Wire Termination Diagrams and Schedules: Coordinate nomenclature and presentation with Drawings and block diagram. Differentiate between manufacturer-installed and field-installed wiring.
6. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices used. Describe characteristics of network and other data communication lines.

C. Samples for Initial Selection: For master- and remote-control stations, and faceplates with factory-applied color finishes and technical features.

D. Samples for Verification: For master- and remote-control stations, and faceplates with factory-applied color finishes and technical features.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Submit evidence that lighting controls are compatible with connected monitoring and control devices and systems.
1. Show interconnecting signal and control wiring, and interface devices that show compatibility of inputs and outputs.
2. For control interfaces and adapters, list network protocols and provide statements from manufacturers that input and output devices comply with interoperability requirements of the protocol.

B. Field quality-control reports.

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For standalone multipreset modular dimming controls to include in emergency, operation, and maintenance manuals.
1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
a. Software manuals.
b. Adjustments of scene preset controls, adjustable fade rates, and fade overrides.
c. Operation of adjustable zone controls.
d. Testing and adjusting of panic and emergency power features.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of standalone multipreset modular dimming controls that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
a. Damage from transient voltage surges.
2. Warranty Period: Cost to repair or replace any parts for two years from date of Substantial Completion.
3. Extended Warranty Period: Cost of replacement parts (materials only, f.o.b. the nearest shipping point to Project site), for eight years, that failed in service due to transient voltage surges.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Compatibility:
1. Dimming control components shall be compatible with luminaires, ballasts, and transformers.
2. Dimming control devices shall be compatible with lighting control system components specified in Section 260943.23 "Relay-Based Lighting Controls," and in Section 260923 "Lighting Control Devices."

B. Dimmers and Dimmer Modules: Comply with UL 508.
1. Audible Noise and RFI Suppression: Solid-state dimmers shall operate smoothly over their operating ranges without audible lamp or dimmer noise or RFI. Modules shall include integral or external filters to suppress audible noise and RFI.
2. Dimmer or Dimmer-Module Rating: Not less than 125 percent of connected load unless otherwise indicated.

C. Capacities: Unit shall be rated for 2400 W at 240-V ac and 2000 W at 120-V ac for up to 100 devices or zones.

D. Surge Protection: Withstand supply power surges without impairment to performance.
1. Panels: 6000 V, 3000 A, complying with IEEE C62.41.1 and IEEE C62.41.2.
2. Other System Devices: 6000 V, 3000 A, complying with IEEE C62.41.1 and IEEE C62.41.2.

E. Off Control Position: User-selected off position of any control point shall disconnect the load from line supply.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 WALL-BOX MULTISCENE DIMMING CONTROLS

A. Description: Factory-fabricated equipment providing manual dimming consisting of a wall-box-mounted master controller. Controls and dimmers shall be integrated for mounting in multigang wall box under a single wall plate. Each zone shall be adjustable to indicated number of scenes, which shall reside in the memory of zone controller.

B. Dimmers: Each zone shall be configurable to control the following loads:
1. LED lamps.
2. Low-voltage lamps, derived with electronic transformers.
3. Non-dim, on-off switching only.

C. Dimmers: Regulate voltages to maintain a constant light level, with no visible flicker, when the source voltage varies plus or minus 2 percent of rms voltage.

D. Memory:
1. Retain preset scenes and fade rates through momentary (up to 3-second) power interruptions.
2. Retain preset scenes through power failures for at least seven days.

E. Device Plates: Style, material, and color shall comply with Section 262726 "Wiring Devices." Master-control cover plate shall be one piece.

F. Master controller shall include the following:
1. Cover-mounted switches, including master off, all bright, and selectors for each scene.

2. Cover-mounted LED indicator lights, one associated with each scene switch, and one for the master off switch.
3. Concealed switches and indicators for specified function.
4. A raise/lower switch for each zone for temporary adjustments of the zone, without altering scene values stored in memory.
5. Fade time indicated by digital display for current scene while fading.
6. Cover-mounted infrared receiver.

G. Infrared Transmitters: Wireless remote control for recalling each of the presets. Operate up to 50 feet (15 m) within line of sight of the master controller.

2.3 MULTIPRESET MODULAR DIMMING CONTROLS

A. Description: Factory-fabricated equipment providing manual dimming consisting of the following:
1. Master controller.
2. Dimmer panels.
3. Controls and dimmers shall be integrated for mounting in a multigang wall box under a single wall plate.
4. Each zone shall be adjustable to indicated number of scenes, which shall reside in the memory of zone controller.

B. Dimmers: Each zone shall be configurable to control the following loads:
1. LED lamps.
2. Low-voltage incandescent lamps, derived with electronic transformers.
3. Non-dim, on-off switching only.

C. Dimmers: Regulate voltages to maintain a constant light level, with no visible flicker, when the source voltage varies plus or minus 2 percent of rms voltage.

D. Memory: Retain preset scenes and fade settings through power failures by retaining physical settings of controls.

E. Device Plates: Style, material, and color shall comply with Section 262726 "Wiring Devices." Master-control cover plate shall be one piece.

F. Master controller shall include the following:
1. Wall-box style, single coverplate supplied by manufacturer.
2. Cover-mounted switches, including master off, all bright, and selectors for each scene.
3. Cover-mounted LED indicator lights, one associated with each scene switch, and one for the master off switch.
4. Concealed switches and indicators for specified function.
5. A raise/lower switch for each zone for temporary adjustments of the zone, without altering scene values stored in memory.
6. Fade time indicated by digital display for current scene while fading.
7. Cover-mounted infrared receiver.

G. Remote-Control Stations:
1. Numbered push buttons to select scenes.
2. Off switch to turn master station off. Operating the off switch at any remote station shall automatically turn on selected housekeeping lighting.
3. On switch turns all scenes of master station to full bright.
4. Control Wiring: NFPA 70, Class 2.
5. Mounting: Single flush wall box with manufacturer's standard faceplate.

H. Infrared Remote-Control Station: Same functions as for standard remote-control station except that functions are input by a hand-held infrared transmitter. Operate up to 50 feet (15 m) within line of sight of the master controller.

I. Dimmer Panels: Modular, plug-in type, complying with UL 508.
   1. Integrated Short-Circuit Rating: 10 kA at 120 V.
   2. Dimmers:
      a. Dimming Circuit: Two SCR dimmers, in inverse parallel configuration.
      b. Dimming Curve: Modified "square law" as specified in IES's "Lighting Handbook"; control voltage is 0- to 10-V dc.
      c. Dimming Range: Zero to 100 percent, full output voltage not less than 98 percent of line voltage.
      d. Voltage Regulation: Dimmer shall maintain a constant light level, with no visible flicker, when the source voltage varies plus or minus 2 percent of rms voltage.

J. Circuit Breakers: Complying with UL 489 and classified as switch duty.

2.4 CONDUCTORS AND CABLES

A. Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Class 2 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 WIRING INSTALLATION

A. Comply with NECA 1.

B. Wiring Method: Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size shall be 1/2 inch (13 mm).

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.

D. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.

E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.2 IDENTIFICATION

A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Label each dimmer module with a unique designation.

C. Label each scene control button with approved scene description.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
   1. Continuity tests of circuits.
   2. Operational Test: Set and operate controls to demonstrate their functions and capabilities in a methodical sequence that cues and reproduces actual operating functions.
      a. Include testing of modular dimming control equipment under conditions that simulate actual operational conditions. Record control settings, operations, cues, and functional observations.

D. Dimming control components will be considered defective if they do not pass tests and inspections.

E. Test Labeling: After satisfactory completion of tests and inspections, apply a label to tested components indicating test results, date, and responsible agency and representative.

F. Reports: Written reports of tests and observations. Record defective materials and workmanship and unsatisfactory test results. Record repairs and adjustments.

3.4 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain modular dimming controls. Laptop portable computer shall be used in training.

B. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control system specified in Section 260943.23 "Relay-Based Lighting Controls."

END OF SECTION 260936

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Straight-blade convenience receptacles.
2. GFCI receptacles.
3. Toggle switches.

1.3 DEFINITIONS

A. BAS: Building automation system.

B. EMI: Electromagnetic interference.

C. GFCI: Ground-fault circuit interrupter.

D. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

E. RFI: Radio-frequency interference.

F. SPD: Surge protective device.

G. UTP: Unshielded twisted pair.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

C. Samples: One for each type of device and wall plate specified, in each color specified.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

D. Devices for Owner-Furnished Equipment:
1. Receptacles: Match plug configurations.
2. Cord and Plug Sets: Match equipment requirements.

E. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STRAIGHT-BLADE RECEPTACLES

A. Duplex Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

2.3 GFCI RECEPTACLES

A. General Description:
1. 125 V, 20 A, straight blade,non-feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

2.4 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.
1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: 0.035-inch- (1-mm-) thick, satin-finished, Type 302 stainless steel.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.5 FINISHES

A. Device Color:
1. Wiring Devices Connected to Normal Power System: Gray unless otherwise indicated or required by NFPA 70 or device listing.
2. SPD Devices: Blue.

B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:
1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:
1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:
a. Cut back and pigtail, or replace all damaged conductors.
b. Straighten conductors that remain and remove corrosion and foreign matter.
c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:
1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.
2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

3.2 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 IDENTIFICATION

A. Comply with Section 260553 "Identification for Electrical Systems."

B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.4 FIELD QUALITY CONTROL

A. Test Instruments: Use instruments that comply with UL 1436.

B. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

C. Perform the following tests and inspections:
1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

D. Tests for Convenience Receptacles:
1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

E. Test straight-blade for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz. (115 g).

F. Wiring device will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

END OF SECTION 262726

SECTION 265119 - LED LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Exterior Solid-state luminaires that use LED technology.
2. Lighting fixture supports.

B. Related Requirements:
1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color Rendering Index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. LED: Light-emitting diode.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaires.
4. Include emergency lighting units, including batteries and chargers.
5. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
6. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing and Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps and accessories identical to those indicated for the lighting fixture as applied in this Project and IES LM-80.
   a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
   b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

B. Shop Drawings: For nonstandard or custom luminaires.
   1. Include plans, elevations, sections, and mounting and attachment details.
   2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Include diagrams for power, signal, and control wiring.

C. Samples: For each luminaire and for each color and texture with standard factory-applied finish.

D. Samples for Initial Selection: For each type of luminaire with custom factory-applied finishes.
   1. Include Samples of luminaires and accessories involving color and finish selection.

E. Samples for Verification: For each type of luminaire.
   1. Include Samples of luminaires and accessories to verify finish selection.

F. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Lighting luminaires.
   2. Suspended ceiling components.
   3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches (300 mm) of the plane of the luminaires.
   4. Structural members to which equipment and or luminaires will be attached.
   5. Initial access modules for acoustical tile, including size and locations.
   6. Items penetrating finished ceiling, including the following:
      a. Other luminaires.
      b. Speakers.
      c. Access panels.
      d. Ceiling-mounted projectors.
   7. Moldings.

B. Qualification Data: For testing laboratory providing photometric data for luminaires.

C. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Product Certificates: For each type of luminaire.

E. Product Test Reports: For each luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency.

F. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.
   1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Lamps: Ten for every 100 of each type and rating installed. Furnish at least one of each type.
   2. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
   3. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.8 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.

C. Provide luminaires from a single manufacturer for each luminaire type.

D. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

E. Mockups: For lighting luminaires in space or module mockups, complete with power and control connections.
   1. Obtain Architect's approval of luminaires in mockups before starting installations.
   2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.10 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

D. Recessed Fixtures: Comply with NEMA LE 4.

E. Bulb shape complying with ANSI C79.1.

F. Lamp base complying with ANSI C81.61.

G. CRI of minimum 80. CCT as indicated on Drawings.

H. Rated lamp life of 50,000 hours.

I. Lamps dimmable from 100 percent to 0 percent of maximum light output.

J. Internal driver.

K. Nominal Operating Voltage: 120 V ac.
1. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

L. Housings:
1. Extruded-aluminum housing and heat sink.
2. Clear anodized finish.

2.2 RECESSED LINEAR

A. Minimum 3,000 lumens. Minimum allowable efficacy of 85lumens per watt.

B. Integral junction box with conduit fittings.

C. Fully gasketed with sealed. IP 65 rated.

2.3 SURFACE MOUNT, NONLINEAR

A. Minimum 750 lumens. Minimum allowable efficacy of 80 lumens per watt.

B. Integral junction box with conduit fittings.

2.4 MATERIALS

A. Metal Parts:
1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

C. Diffusers and Globes: As indicated on Drawings.

1. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
2. Glass: Annealed crystal glass unless otherwise indicated.
3. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

D. Housings:
1. Extruded-aluminum housing and heat sink.
2. Clear anodized finish.

E. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
1. Label shall include the following lamp characteristics:
a. "USE ONLY" and include specific lamp type.
b. Lamp diameter, shape, size, wattage, and coating.
c. CCT and CRI for all luminaires.

2.5 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.6 LUMINAIRE FIXTURE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).

D. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before fixture installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

3.3 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:
1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.

E. Flush-Mounted Luminaire Support:
1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

F. Wall-Mounted Luminaire Support:
1. Attached to structural members in walls or as indicated on Drawings.
2. Do not attach luminaires directly to gypsum board.

G. Ceiling-Mounted Luminaire Support:
1. Ceiling mount with two 5/32-inch- (4-mm-) diameter aircraft cable supports adjustable to 120 inches (6 m) in length.
2. Ceiling mount with four-point pendant mount with 5/32-inch- (4-mm-) diameter aircraft cable supports adjustable to 120 inches (6 m) in length.
3. Ceiling mount with hook mount.

H. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

3.6 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
   1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
   2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
   3. Adjust the aim of luminaires in the presence of the Architect.

END OF SECTION 265119

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SECTION 270526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Grounding conductors.
2. Grounding connectors.
3. Grounding busbars.
4. Grounding labeling.

1.3 DEFINITIONS

A. BCT: Bonding conductor for telecommunications.

B. EMT: Electrical metallic tubing.

C. TGB: Telecommunications grounding busbar.

D. TMGB: Telecommunications main grounding busbar.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For communications equipment room signal reference grid. Include plans, elevations, sections, details, and attachments to other work.

1.5 INFORMATIONAL SUBMITTALS

A. As-Built Data: Plans showing as-built locations of grounding and bonding infrastructure, including the following:
1. BCT, TMGB, TGBs, and routing of their bonding conductors.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.
1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
a. Result of the bonding-resistance test at each TGB and its nearest grounding electrode.

PART 2 - PRODUCTS

2.1 SYSTEM COMPONENTS

A. Comply with J-STD-607-A.

2.2 CONDUCTORS

A. Comply with UL 486A-486B.

B. Insulated Conductors: Stranded copper wire, green or green with yellow stripe insulation, insulated for 600 V, and complying with UL 83.
   1. Ground wire for custom-length equipment ground jumpers shall be No. 6 AWG, 19-strand, UL-listed, Type THHN wire.

C. Bare Copper Conductors:
   1. Solid Conductors: ASTM B 3.
   2. Stranded Conductors: ASTM B 8.
   3. Tinned Conductors: ASTM B 33.
   4. Bonding Cable: 28 kcmils (14.2 sq. mm), 14 strands of No. 17 AWG conductor, and 1/4 inch (6.3 mm) in diameter.
   5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
   6. Bonding Jumper: Tinned-copper tape, braided conductors terminated with two-hole copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.3 CONNECTORS

A. Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A-486B.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following (or approved equal):
   1. Burndy; Part of Hubbell Electrical Systems.
   2. Chatsworth Products, Inc.
   3. Harger Lightning & Grounding.
   4. Panduit Corp.
   5. Tyco Electronics Corp.

C. Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL 467.
   1. Electroplated tinned copper, C and H shaped.

D. Signal Reference Grid Connectors: Combination of compression wire connectors, access floor grounding clamps, bronze U-bolt grounding clamps, and copper split-bolt connectors, designed for the purpose.

E. Busbar Connectors: Cast silicon bronze, solderless exothermic-type, mechanical connector; with a long barrel and two holes spaced on 5/8- or 1-inch (15.8- or 25.4-mm) centers for a two-bolt connection to the busbar.

F. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.4 GROUNDING BUSBARS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Chatsworth Products, Inc.
2. Harger Lightning & Grounding.
3. Panduit Corp.

B. TMGB: Predrilled, wall-mounted, rectangular bars of hard-drawn solid copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, length as indicated on Drawings. The busbar shall be NRTL listed for use as TMGB and shall comply with J-STD-607-A.
1. Predrilling shall be with holes for use with lugs specified in this Section.
2. Mounting Hardware: Stand-off brackets that provide a 4-inch ((100-mm)) clearance to access the rear of the busbar. Brackets and bolts shall be stainless steel.
3. Stand-off insulators for mounting shall be Lexan or PVC. Comply with UL 891 for use in 600-V switchboards, impulse tested at 5000 V.

C. Cabinet Grounding Busbars: Rectangular bars of hard-drawn solid copper, accepting conductors ranging from No. 14 to No. 2/0 AWG, NRTL listed as complying with UL 467, and complying with J-STD-607-A. Predrilling shall be with holes for use with lugs specified in this Section.
1. Cabinet-Mounted Busbar: Terminal block, with stainless-steel or copper-plated hardware for attachment to the cabinet.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the ac grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of the electrical system.

B. Inspect the test results of the ac grounding system measured at the point of BCT connection.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with connection of the BCT only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Bonding shall include the ac utility power service entrance, the communications cable entrance, and the grounding electrode system. The bonding of these elements shall form a loop so that each element is connected to at least two others.

B. Comply with NECA 1.

C. Comply with J-STD-607-A.

3.3 APPLICATION

A. Conductors: Install solid conductor for No. 8 AWG and smaller and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
1. The bonding conductors between the TGB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.
2. The bonding conductors between the TMGB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.

B. Conductor Terminations and Connections:
   1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
   2. Connections to Structural Steel: Welded connectors.

C. Conductor Support:
   1. Secure grounding and bonding conductors at intervals of not less than 36 inches ((900 mm).)

D. Grounding and Bonding Conductors:
   1. Install in the straightest and shortest route between the origination and termination point, and no longer than required. The bend radius shall not be smaller than eight times the diameter of the conductor. No one bend may exceed 90 degrees.
   2. Install without splices.
   3. Support at not more than 36-inch (900-mm) intervals.
   4. Install grounding and bonding conductors in 3/4-inch (21-mm) PVC conduit until conduit enters a telecommunications room. The grounding and bonding conductor pathway through a plenum shall be in EMT. Conductors shall not be installed in EMT unless otherwise indicated.
      a. If a grounding and bonding conductor is installed in ferrous metallic conduit, bond the conductor to the conduit using a grounding bushing and bond both ends of the conduit to a TGB.

3.4 GROUNDING BUSBARS

A. Indicate locations of grounding busbars on Drawings. Install busbars horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 12 inches (300 mm) above finished floor unless otherwise indicated.

3.5 CONNECTIONS

A. Bond metallic equipment in a telecommunications equipment room to the grounding busbar in that room, using equipment grounding conductors not smaller than No. 6 AWG.

B. Stacking of conductors under a single bolt is not permitted when connecting to busbars.

C. Assemble the wire connector to the conductor, complying with manufacturer's written instructions and as follows:
   1. Use crimping tool and the die specific to the connector.
   2. Pretwist the conductor.
   3. Apply an antioxidant compound to all bolted and compression connections.

D. Primary Protector: Bond to the TMGB with insulated bonding conductor.

E. Interconnections: Interconnect all TGBs with the TMGB with the telecommunications backbone conductor. If more than one TMGB is installed, interconnect TMGBs using the grounding equalizer conductor. The telecommunications backbone conductor and grounding equalizer conductor size shall not be less than 2 kcmils/linear foot (1 sq. mm/linear meter) of conductor length, up to a maximum size of No. 3/0 AWG168 kcmils (85 sq. mm) unless otherwise indicated.

F. Telecommunications Enclosures and Equipment Racks: Bond metallic components of enclosures to the telecommunications bonding and grounding system. Install vertically mounted rack grounding busbar unless the enclosure and rack are manufactured with the busbar. Bond the equipment grounding busbar to the TGB No. 2 AWG bonding conductors.

G. Structural Steel: Where the structural steel of a steel frame building is readily accessible within the room or space, bond each TGB and TMGB to the vertical steel of the building frame.

H. Electrical Power Panelboards: Where an electrical panelboard for telecommunications equipment is located in the same room or space, bond each TGB to the ground bar of the panelboard.

I. Shielded Cable: Bond the shield of shielded cable to the TGB in communications rooms and spaces. Comply with TIA/EIA-568-B.1 and TIA/EIA-568-B.2 when grounding screened, balanced, twisted-pair cables.

J. Rack- and Cabinet-Mounted Equipment: Bond powered equipment chassis to the cabinet or rack grounding bar. Power connection shall comply with NFPA 70; the equipment grounding conductor in the power cord of cord- and plug-connected equipment shall be considered as a supplement to bonding requirements in this Section.

K. Access Floors: Bond all metal parts of access floors to the TGB.

L. Equipment Room Signal Reference Grid: Provide a low-impedance path between telecommunications cabinets, equipment racks, and the reference grid, using No. 6 AWG bonding conductors.
1. Install the conductors in grid pattern on 4-foot (1200-mm) centers, allowing bonding of one pedestal from each access floor tile.
2. Bond the TGB of the equipment room to the reference grid at two or more locations.
3. Bond all conduits and piping entering the equipment room to the TGB at the perimeter of the room.

3.6 IDENTIFICATION

A. Labels shall be preprinted or computer-printed type.
1. Label TMGB(s) with "fs-TMGB," where "fs" is the telecommunications space identifier for the space containing the TMGB.
2. Label TGB(s) with "fs-TGB," where "fs" is the telecommunications space identifier for the space containing the TGB.
3. Label the BCT and each telecommunications backbone conductor at its attachment point: "WARNING! TELECOMMUNICATIONS BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT!"

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:
1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
2. Test the bonding connections of the system using an ac earth ground-resistance tester, taking two-point bonding measurements in each telecommunications equipment room containing a TMGB and a TGB and using the process recommended by BICSI TDMM. Conduct tests with the facility in operation.
   a. Measure the resistance between the busbar and the nearest available grounding electrode. The maximum acceptable value of this bonding resistance is 100 milliohms.
3. Test for ground loop currents using a digital clamp-on ammeter, with a full-scale of not more than 10 A, displaying current in increments of 0.01 A at an accuracy of plus/minus 2.0 percent.
   a. With the grounding infrastructure completed and the communications system electronics operating, measure the current in every conductor connected to the TMGB. Maximum acceptable ac current level is 1 A.

C. Excessive Ground Resistance: If resistance to ground at the BCT exceeds 5 ohms, notify Architect promptly and include recommendations to reduce ground resistance.

D. Grounding system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION 270526

SECTION 271500 - COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. UTP cabling.
2. 50/125 -micrometer, optical fiber cabling, as required.
3. Coaxial cable.
4. Cable connecting hardware, patch panels, and cross-connects.
5. Telecommunications outlet/connectors.
6. Cabling system identification products.

B. Related Requirements:
1. associated with system panels and devices.
2. Section 280513 "Conductors and Cables for Electronic Safety and Security" for voice and data cabling associated with system panels and devices.

1.3 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

C. EMI: Electromagnetic interference.

D. IDC: Insulation displacement connector.

E. LAN: Local area network.

F. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.

G. RCDD: Registered Communications Distribution Designer.

H. UTP: Unshielded twisted pair.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate layout and installation of telecommunications cabling with Owner's telecommunications and LAN equipment and service suppliers.

B. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. For coaxial cable, include the following installation data for each type used:
a. Nominal OD.
b. Minimum bending radius.
c. Maximum pulling tension.

B. Shop Drawings:
1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
2. Cabling administration drawings and printouts.
3. Wiring diagrams to show typical wiring schematics, including the following:
a. Cross-connects.
b. Patch panels.
c. Patch cords.
4. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.

1.6 INFORMATIONAL SUBMITTALS

A. Source quality-control reports.

B. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For splices and connectors to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
1. Layout Responsibility: Preparation of Shop Drawings, Cabling Administration Drawings, and field testing program development by an RCDD.
2. Installation Supervision: Installation shall be under the direct supervision of Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site.
1. Test optical fiber cables to determine the continuity of the strand end to end. Use optical loss test set.
2. Test optical fiber cables while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector; including the loss value of each. Retain test data and include the record in maintenance data.
3. Test each pair of UTP cable for open and short circuits.

PART 2 - PRODUCTS

2.1 HORIZONTAL CABLING DESCRIPTION

A. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications

equipment room. This cabling and its connecting hardware are called a "permanent link," a term that is used in the testing protocols.
1. TIA/EIA-568-B.1 requires that a minimum of two telecommunications outlet/connectors be installed for each work area.
2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet/connector.
3. Bridged taps and splices shall not be installed in the horizontal cabling.
4. Splitters shall not be installed as part of the optical fiber cabling.

B. A work area is approximately 100 sq. ft. (9.3 sq. m), and includes the components that extend from the telecommunications outlet/connectors to the station equipment.

C. The maximum allowable horizontal cable length is 295 feet (90 m). This maximum allowable length does not include an allowance for the length of 16 feet (4.9 m) to the workstation equipment or in the horizontal cross-connect.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-B.1 when tested according to test procedures of this standard.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Grounding: Comply with J-STD-607-B.

2.3 UTP CABLE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following (or approved equal):
1. 3M.
2. AMP NETCONNECT; a TE Connectivity Ltd. company.
3. Belden CDT Networking Division/NORDX.
4. Berk-Tek Leviton; a Nexans/Leviton alliance.
5. CommScope, Inc.
6. General Cable; General Cable Corporation.
7. Mohawk; a division of Belden Networking, Inc.
8. Optical Cable Corporation.
9. SYSTIMAX Solutions; a CommScope Inc. brand.

B. Description: 100-ohm, four-pair UTP, formed into 25-pair, binder groups covered with a blue thermoplastic jacket.
1. Comply with ICEA S-90-661 for mechanical properties.
2. Comply with TIA/EIA-568-B.1 for performance specifications.
3. Comply with TIA/EIA-568-B.2, Category 6.
4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
   a. Communications, General Purpose: Type CM or CMG; or MPP, CMP, MPR, CMR, MP, or MPG.

b. Communications, Riser Rated: Type CM; or MPP, CMP, or MPR, complying with UL 1666.
c. Communications, Limited Purpose: Type CMX; or MPP, CMP, MPR, CMR, MP, MPG, CM, or CMG.
d. Multipurpose: Type MP or MPG; or MPP or MPR.
e. Multipurpose, Riser Rated: Type MPRcomplying with UL 1666.
f. UTP cables shall be outdoor rated.

2.4 UTP CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following (or approved equal):
1. American Technology Systems Industries, Inc.
2. AMP NETCONNECT; a TE Connectivity Ltd. company.
3. Belden CDT Networking Division/NORDX.
4. Hubbell Premise Wiring.
5. Leviton Manufacturing Co., Inc.
6. Optical Cable Corporation.
7. Panduit Corp.

B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.

C. Connecting Blocks: 110-style IDC for Category 6. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.

D. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
1. Number of Jacks per Field: One for each four-pair conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria.

E. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.

F. Patch Cords: Factory-made, four-pair cables in 48-inch 1200-mm lengths; terminated with eight-position modular plug at each end.
1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.
2. Patch cords shall have color-coded boots for circuit identification.

2.5 OPTICAL FIBER CABLE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following (or approved equal):
1. 3M.
2. AMP NETCONNECT; a TE Connectivity Ltd. company.
3. Belden CDT Networking Division/NORDX.
4. Berk-Tek Leviton; a Nexans/Leviton alliance.
5. CommScope, Inc.
6. Corning Cable Systems.
7. Mohawk; a division of Belden Networking, Inc.
8. SYSTIMAX Solutions; a CommScope Inc. brand.

B. Description: Multimode, 50/125 -micrometer, 24-fiber, nonconductive, tight buffer, optical fiber cable, as required.
   1. Comply with ICEA S-83-596 for mechanical properties.
   2. Comply with TIA/EIA-568-B.3 for performance specifications.
   3. Comply with TIA-492AAAA-A for detailed specifications.
   4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
      a. General Purpose, Nonconductive: Type OFN or OFNG, or OFNR, OFNP.
      b. Riser Rated, Nonconductive: Type OFN or OFNP, complying with UL 1666.
   5. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
   6. Minimum Modal Bandwidth: 160 MHz-km at 850 nm; 500 MHz-km at 1300 nm.

C. Jacket:
   1. Jacket Color: Yellow for 50/125-micrometer cable.
   2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-C.
   3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).

2.6 OPTICAL FIBER CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following (or approved equal):
   1. ADC.
   2. American Technology Systems Industries, Inc.
   3. Belden CDT Networking Division/NORDX.
   4. Berk-Tek Leviton; a Nexans/Leviton alliance.
   5. Corning Cable Systems.
   6. CSI Technologies Inc.
   7. Dynacom Corporation.
   8. Hubbell Premise Wiring.
   9. Molex Premise Networks.
   10. Optical Cable Corporation.

B. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.
   1. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.

C. Patch Cords: Factory-made, dual-fiber cables in 36-inch (900-mm) lengths.

D. Cable Connecting Hardware:
   1. Comply with Optical Fiber Connector Intermateability Standards (FOCIS) specifications of TIA-604-2-B, TIA-604-3-B, and TIA/EIA-604-12. Comply with TIA/EIA-568-B.3.
   2. Quick-connect, simplex and duplex, Type SC, Type ST, or Type LC connectors, as requried. Insertion loss not more than 0.75 dB.
   3. Type SFF connectors may be used in termination racks, panels, and equipment packages.

2.7 COAXIAL CABLE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following (or approved equal):
   1. Alpha Wire.
   2. Belden CDT Networking Division/NORDX.
   3. Coleman Cable, Inc.
   4. CommScope, Inc.
   5. Draka USA.

B. Cable Characteristics: Broadband type, recommended by cable manufacturer specifically for broadband data transmission applications. Coaxial cable and accessories shall have 75-ohm nominal impedance with a return loss of 20 dB maximum from 7 to 806 MHz.

C. RG-11/U: NFPA 70, Type CATV.
1. No. 14 AWG, solid, copper-covered steel conductor.
2. Gas-injected, foam-PE insulation.
3. Double shielded with 100 percent aluminum polyester tape and 60 percent aluminum braid.
4. Jacketed with sunlight-resistant, black PVC or PE.
5. Suitable for outdoor installations in ambient temperatures ranging from minus 40 to plus 85 deg C.

D. RG59/U: NFPA 70, Type CATVR.
1. No. 20 AWG, solid, silver-plated, copper-covered steel conductor.
2. Gas-injected, foam-PE insulation.
3. Triple shielded with 100 percent aluminum polyester tape and 95 percent aluminum braid; covered by aluminum foil with grounding strip.
4. Color-coded PVC jacket.

E. RG-6/U: NFPA 70, Type CATV or CM.
1. No. 16 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
2. Double shielded with 100 percent aluminum-foil shield and 60 percent aluminum braid.
3. Jacketed with black PVC or PE.
4. Suitable for indoor installations.

F. RG59/U: NFPA 70, Type CATV.
1. No. 20 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
2. Double shielded with 100 percent aluminum polyester tape and 40 percent aluminum braid.
3. PVC jacket.

G. RG59/U (Plenum Rated): NFPA 70, Type CMP.
1. No. 20 AWG, solid, copper-covered steel conductor; foam fluorinated ethylene propylene insulation.
2. Double shielded with 100 percent aluminum-foil shield and 65 percent aluminum braid.
3. Copolymer jacket.

H. NFPA and UL compliance, listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1655 and with NFPA 70 "Radio and Television Equipment" and "Community Antenna Television and Radio Distribution" Articles. Types are as follows:
1. CATV Cable: Type CATV.
2. CATV Plenum Rated: Type CATVP, complying with NFPA 262.
3. CATV Riser Rated: Type CATVR; or CATVP, CATVR, or CATV, complying with UL 1666.
4. CATV Limited Rating: Type CATVX.
5. Cables shall be outdoor rated.

2.8 COAXIAL CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following (or approved equal):
1. Emerson Network Power Connectivity Solutions.
2. Leviton Manufacturing Co., Inc.
3. Siemon Co. (The).

B. Coaxial-Cable Connectors: Type BNC, 75 ohms.

2.9 TELECOMMUNICATIONS OUTLET/CONNECTORS

A. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-B.1.

B. Plastic Faceplate: High-impact plastic. Coordinate color with Section 262726 "Wiring Devices."

C. Metal Faceplate: Stainless steel, complying with requirements in Section 262726 "Wiring Devices."

D. For use with snap-in jacks accommodating any combination of UTP, optical fiber, and coaxial work area cords.
   1. Flush mounting jacks, positioning the cord at a 45-degree angle.

E. Legend: Snap-in, clear-label covers and machine-printed paper inserts.

2.10 GROUNDING

A. Comply with requirements in Section 270526 "Grounding and Bonding for Communications Systems" for grounding conductors and connectors.

B. Comply with J-STD-607-B.

2.11 IDENTIFICATION PRODUCTS

A. Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

B. Comply with requirements in Section 260553 "Identification for Electrical Systems."

2.12 SOURCE QUALITY CONTROL

A. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.

B. Factory test UTP cables according to TIA/EIA-568-B.2.

C. Factory test multimode optical fiber cables according to TIA-526-14-A and TIA/EIA-568-B.3.

D. Factory-sweep test coaxial cables at frequencies from 5 MHz to 1 GHz. Sweep test shall test the frequency response, or attenuation over frequency, of a cable by generating a voltage whose frequency is varied through the specified frequency range and graphing the results.

E. Cable will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 WIRING METHODS

A. Install cables in pathways and cable trays except within consoles, cabinets, desks, and counters. Conceal pathways and cables except in unfinished spaces.
   1. Install plenum cable in environmental air spaces, including plenum ceilings.

B. Wiring within Enclosures:

1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
2. Install lacing bars and distribution spools.
3. Install conductors parallel with or at right angles to sides and back of enclosure.

3.2 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:
1. Comply with TIA/EIA-568-B.1.
2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
3. Install 110-style IDC termination hardware unless otherwise indicated.
4. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
5. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
6. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
8. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
10. In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.
11. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. UTP Cable Installation:
1. Comply with TIA/EIA-568-B.2.
2. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

D. Optical Fiber Cable Installation:
1. Comply with TIA/EIA-568-B.3.
2. Cable may be terminated on connecting hardware that is rack or cabinet mounted.

E. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend UTP cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1524 mm) apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

F. Installation of Cable Routed Exposed under Raised Floors:
1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.
3. Coil cable 6 feet (1800 mm) long not less than 12 inches (300 mm) in diameter below each feed point.

G. Outdoor Coaxial Cable Installation:

1. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed O-rings to keep out moisture.
2. Attach antenna lead-in cable to support structure at intervals not exceeding 36 inches (915 mm).

H. Group connecting hardware for cables into separate logical fields.

I. Separation from EMI Sources:
1. Comply with BICSI TDMM and TIA-569-B for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.3 FIRESTOPPING

A. Comply with TIA-569-B, Annex A, "Firestopping."

B. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.4 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with J-STD-607-B.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.5 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
1. Administration Class: 2.
2. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.

B. Use unique, alphanumeric designation for each cable and label cable, jacks, connectors, and terminals to which it connects with same designation.

C. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2 level of administration.

D. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

E. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by Owner.

F. Cable and Wire Identification:
1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet (4.5 m).
4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
   a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
   b. Label each unit and field within distribution racks and frames.
5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

G. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.
1. Cables use flexible vinyl or polyester that flex as cables are bent.

3.6 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
1. Visually inspect UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
2. Visually confirm Category 6, marking of outlets, cover plates, outlet/connectors, and patch panels.
3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
4. Test UTP backbone copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
   a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
5. Optical Fiber Cable Tests:

a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
b. Link End-to-End Attenuation Tests:
1) Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in 1 direction according to TIA-526-14-A, Method B, One Reference Jumper.
2) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.

6. UTP Performance Tests:
a. Test for each outlet. Perform the following tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.2:
1) Wire map.
2) Length (physical vs. electrical, and length requirements).
3) Insertion loss.
4) Near-end crosstalk (NEXT) loss.
5) Power sum near-end crosstalk (PSNEXT) loss.
6) Equal-level far-end crosstalk (ELFEXT).
7) Power sum equal-level far-end crosstalk (PSELFEXT).
8) Return loss.
9) Propagation delay.
10) Delay skew.

7. Optical Fiber Cable Performance Tests: Perform optical fiber end-to-end link tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.3.

B. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.

C. End-to-end cabling will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets.

END OF SECTION 271500

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SECTION 280513 - CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. UTP cabling.
2. RS-232 cabling.
3. RS-485 cabling.
4. Control-voltage cabling.
5. Control-circuit conductors.
6. Identification products.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. IDC: Insulation displacement connector.

C. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.

D. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).

E. RCDD: Registered Communications Distribution Designer.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate layout and installation of electronic safety and security cabling with Owner's telecommunications and LAN equipment and service suppliers.

B. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Installation data for UTP and optical-fiber cables as specified in TIA 569-C-1.
2. For coaxial cable, include the following installation data for each type used:
   a. Nominal OD.
   b. Minimum bending radius.
   c. Maximum pulling tension.

B. Shop Drawings:
1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.

2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
3. Cabling administration drawings and printouts.
4. Wiring diagrams to show typical wiring schematics, including the following:
   a. Cross-connects.
   b. Patch panels.
   c. Patch cords.
5. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.

B. Source quality-control reports.

C. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: An NRTL.
   1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site.
   1. Test optical-fiber cable to determine the continuity of the strand, end to end. Use optical loss test set.
   2. Test optical-fiber cable on reels. Use an optical time domain reflectometer to verify the cable length, and locate cable defects, splices, and connector; include the loss value of each. Retain test data and include the record in maintenance data.
   3. Test each pair of UTP cable for open and short circuits.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: 25or less.
   2. Smoke-Developed Index: 50 or less.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 UTP CABLE

A. Description: 100-ohm, four-pair UTP, covered with a blue thermoplastic jacket.
   1. Comply with ICEA S-90-661 for mechanical properties.
   2. Comply with TIA-568-C.1 for performance specifications.
   3. Comply with TIA-568-C.2, Category 6.
   4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:

a. Communications, General Purpose: Type CM or Type C; or Type MPP, Type CMP, Type MPR, Type CMR, Type MP, or Type MPG.
b. Communications, Plenum Rated: Type CMP or Type MPP, complying with NFPA 262.
c. Communications, Riser Rated: Type CMR; or Type MPP, Type CMP, or Type MPR, complying with UL 1666.
d. Communications, Limited Purpose: Type CMX; or Type MPP, Type CMP, Type MPR, Type CMR, Type MP, Type MPG, Type CM, or Type CMG.
e. Multipurpose: Type MP or Type MPG; or Type MPP or Type MPR.
f. Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
g. Multipurpose, Riser Rated: Type MP or Type MPP, complying with UL 1666.

2.3 UTP CABLE HARDWARE

A. UTP Cable Connecting Hardware: IDC type, using modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of the same category or higher.

B. Connecting Blocks: 110-style for Category 6. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.

C. NFPA and UL Compliance: Coaxial cables shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1655 and with NFPA 70, Article 820 "Radio and Television Equipment" and Article 830 "Community Antenna Television and Radio Distribution Systems." Types are as follows:
1. CATV Cable: Type CATV, or Type CATVP or Type CATVR.
2. CATV Plenum Rated: Type CATVP, complying with NFPA 262.
3. CATV Riser Rated: Type CATV; or Type CATVP, Type CATVR, or Type CATV, complying with UL 1666.
4. CATV Limited Rating: Type CATVX.

2.4 RS-232 CABLE

A. Standard Cable: NFPA 70, Type CM.
1. Three, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Polypropylene insulation.
3. Aluminum foil-polyester tape shield with 100 percent shield coverage.
4. PVC jacket.
5. Conductors are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
6. Flame Resistance: Comply with UL 1581.

B. Plenum-Rated Cable: NFPA 70, Type CMP.
1. Three, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. PE insulation.
3. Aluminum foil-polyester tape shield with 100 percent shield coverage.
4. Fluorinated ethylene propylene jacket.
5. Conductors are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
6. Flame Resistance: Comply with NFPA 262.

2.5 RS-485 CABLE

A. Standard Cable: NFPA 70, Type CM or Type CMG.
1. Paired, two pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. PVC insulation.
3. Unshielded.

4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

B. Plenum-Rated Cable: NFPA 70, Type CMP.
1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. Flame Resistance: NFPA 262, Flame Test.

2.6 CONTROL-VOLTAGE CABLE

A. Paired Cable: NFPA 70, Type CMG.
1. One pair, twisted No. 16 AWG, stranded (19x29) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

2.7 CONTROL-CIRCUIT CONDUCTORS

A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, complying with UL 83, in pathway Class 2 Control Circuits: Stranded copper, Type THHN-THWN, complying with UL 83, in pathway.

B. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or TF in pathway complying with UL 83.

2.8 IDENTIFICATION PRODUCTS

A. Comply with TIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

B. Comply with requirements in Section 260553 "Identification for Electrical Systems."

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate cables.

B. Factory test UTP and optical-fiber cables on reels according to TIA-568-C.1.

C. Factory test UTP cables according to TIA-568-C.2.

D. Factory test multimode optical fiber cables according to TIA-526.14-B and TIA-568-C.3.

E. Factory sweep test coaxial cables at frequencies from 5 MHz to 1 GHz. Sweep test shall test the frequency response, or attenuation over frequency, of a cable by generating a voltage whose frequency is varied through the specified frequency range and graphing the results. Structural Return Loss shall be less than 20 db.

F. Cable will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for installation of supports for cables.

3.2 WIRING METHOD

A. Install wiring in metal pathways and wireways.
   1. Minimum conduit size shall be 1”. Control and data-transmission wiring shall not share conduits with other building wiring systems.

B. Install cable, concealed in accessible ceilings, walls, and floors when possible.

C. Wiring on Racks and within Enclosures:
   1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM's "Cabling Termination Practices" chapter. Cable ties shall not be excessively tightened such that the transmission characteristics of the cable are altered.
   2. Install lacing bars and distribution spools.
   3. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer.
   4. Install conductors parallel with or at right angles to sides and back of enclosure.
   5. Connect conductors associated with intrusion system that are terminated, spliced, or interrupted in any enclosure onto terminal blocks.
   6. Mark each terminal according to system's wiring diagrams.
   7. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1 and NFPA 70.

B. Conductors: Size according to system manufacturer's written instructions unless otherwise indicated.

C. Do not install conductors and cables that are wet, moisture damaged, or mold damaged.

D. Install UTP, optical-fiber, and coaxial cables and connecting materials after spaces are complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

E. General Requirements for Cabling:
   1. Comply with TIA-568-C.1.
   2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
   3. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels. Leave a minimum of 6 inches (150 mm) of slack at outlet terminations and coil loosely into box after termination on outlet fitting.
   4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
   5. Maintain minimum cable bending radius during installation and termination of cables.

6. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
7. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
8. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions. Do not exceed manufacturer's rated cable-pulling tension.
9. Riser Cable: Riser cable support intervals shall be in accordance with manufacturer's recommendations.
10. Comply with Section 280544 "Sleeves and Sleeve Seals for Electronic Safety and Security Pathways and Cabling."

F. UTP Cable Installation: Install using techniques, practices, and methods that are consistent with Category 6 rating of components and that ensure Category 6performance of completed and linked signal paths, end to end.
1. Comply with TIA-568-C.2.
2. Install 110-style IDC termination hardware unless otherwise indicated.
3. Do not untwist UTP cables more than 1/2 inch (12 mm) from point of termination to maintain cable geometry.

G. Optical-Fiber Cable Installation:
1. Comply with TIA-568-C.3.
2. Cable shall be terminated on connecting hardware that is rack or cabinet mounted.

H. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunication spaces with terminating hardware and interconnection equipment.
2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1525 mm) apart. Cable supports shall be fastened to structural members or floor slabs in accordance with Section 260529 "Hangers and Supports for Electrical Systems."
3. Cable shall not be run in contact with pipes, ducts, or other potentially damaging items. Cables shall not be run through structural members or use structural members, pipes, ducts, or equipment as a support.

I. Installation of Cable Routed Exposed under Raised Floors:
1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.
3. Cable 72 inches (1830 mm) long shall be neatly coiled not less than 12 inches (300 mm) in diameter below each feed point.

J. Separation from EMI Sources:
1. Comply with BICSI TDMM and TIA-569-C recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communication cables or cables in nonmetallic pathways and unshielded power conductors and electrical equipment shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (600 mm).
3. Separation between communication cables in grounded metallic pathways and unshielded power lines or electrical equipment shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).

4. Separation between cables in grounded metallic pathways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
   a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (75 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Cables and Electrical Motors and Transformers, 5 kVA or hp and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.4 FIRE ALARM WIRING INSTALLATION

A. Comply with NECA 1 and NFPA 72.

B. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

C. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

3.5 POWER AND CONTROL-CIRCUIT CONDUCTORS

A. 120-V Power Wiring: Install according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables" unless otherwise indicated.

B. Minimum Conductor Sizes:
   1. Class 1 remote-control and signal circuits, No. 14 AWG.
   2. Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.
   3. Class 3 low-energy, remote-control, alarm and signal circuits, No. 12 AWG.

3.6 GROUNDING

A. For communication wiring, comply with J-STD-607-A and with BICSI TDMM's "Grounding, Bonding, and Electrical Protection" chapter.

3.7 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA-606-B. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
   1. Visually inspect UTP and optical-fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations to confirm color coding for pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1.

2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test UTP cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross connection.
   a. Test instruments shall comply with or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
4. Optical-Fiber Cable Tests:
   a. Test instruments shall comply with or exceed applicable requirements in TIA-568-C.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
   b. Link End-to-End Attenuation Tests:
      1) Multimode Link Measurements: Test at 850 or 1300 nm in one direction according to TIA-526-14-B, Method B, One Reference Jumper.
      2) Attenuation test results for links shall be less than 2.0 db. Attenuation test results shall be less than that calculated according to equation in TIA-568-C.1.

D. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.

E. End-to-end cabling will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION 280513