

BID FOR
NUGGET EVENTS CENTER FORECOURT

BID # 22/23-009

PWP # WA-2023-077

BIDS DUE NOT LATER THAN: 1:45 PM ON NOVEMBER 16, 2022

PUBLIC BID OPENING: 2:00 PM ON NOVEMBER 16, 2022

[NOTE: TIME BIDS ARE DUE IS DIFFERENT FROM BID OPENING TIME]



431 PRATER WAY
P.O. BOX 857
SPARKS, NV 89432-0857

Company Name: _____

**CITY OF SPARKS
NOTICE TO BIDDERS
NUGGET EVENTS CENTER FORECOURT
BID # 22/23-009 / PWP # WA-2023-077**

NOTICE IS HEREBY GIVEN that the City of Sparks, Nevada, will receive written sealed bids only, for the project listed above. Said bids must be in the hands of the Contracts and Risk Manager at 431 Prater Way, Sparks, Nevada, **NO LATER THAN 1:45 PM ON NOVEMBER 16, 2022.** Bids postmarked prior to, but not received until after this deadline will not be accepted. Vendor bid response submittals may not be sent to the City of Sparks via the Internet/e-mail and will not be entertained for award by the City of Sparks. The right is reserved to reject any Bid/Proposal or to accept the Bid/Proposal which is deemed by the City of Sparks to be in the best interest of the City of Sparks. The City of Sparks reserves the right to waive any irregularities and/or informalities in the bid process.

All Bids are to be marked clearly on the outside. Due to hybrid schedules and staff reductions, in-person staff availability is limited. Bidders wishing to physically deliver their bids on the bid due date shall note that the Purchasing Office will receive bids in the lobby of City Hall beginning at 1PM on November 16th. Bids are due no later than 1:45PM. Bids may also be delivered to the Purchasing Department physical dropbox/mailbox, also located in the lobby of City Hall.

Bids will be opened and publicly read at **2:00 PM ON NOVEMBER 16, 2022** via Zoom video/audio conferencing. Meeting # 840 3371 1904. Meeting Passcode: 405756 with a direct link of: <https://us02web.zoom.us/j/84033711904?pwd=RHA0d0xWd1YzU0JQMEROLzVPRnhYQT09>

PROJECT DESCRIPTION: Work includes shade structures, raised planter seating, new pavers, new concrete, landscaping, turf, irrigation, electrical, pylon with video board, lighting, and speakers, along with all appurtenant work necessary to complete the project as stated in the bid specifications.

PRE-BID MEETING: A **NON-MANDATORY** pre-bid meeting will be held at 10AM on November 2, 2022 at the job site: 1040 Victorian Ave., Sparks NV 89431.

BONDING/LICENSING: A Bid Bond in the amount of 5% of bid amount is required. This bid bond will function as a penalty in the event the successful bidder fails to enter into a written contract with the City in accordance with the bid documents. Additionally, the City will be entitled to actual damages, if any. Prospective bidders will be required to have a current Contractor's License under the Nevada State Law for the type of work specified herein.

The work to be performed under this Contract shall be commenced by the successful Bidder after all executed Contract documents have been submitted, and after being notified to proceed by the City of Sparks.

Bid documents and specifications may be obtained from the City of Sparks website. Please visit <http://portal.cityofsparks.us/bids> to obtain complete bid documents. There is no cost to use the system or obtain plans, but registration at the site is required. It is the responsibility of all potential bidders/responders to monitor the Purchasing Division's website for any changing information prior to submitting their bid/proposal. The City of Sparks will not be responsible for the timeliness or completeness of information provided by any 3rd party bid listing or re-selling service. For further information, contact the Purchasing Division at dmarran@cityofsparks.us or at (775) 353-2273. The individual responsible for coordinating this bid is: Dan Marran, CPPO, C.P.M. – Contracts and Risk Manager

Reno Gazette Journal Legal Notices Section
Publish Date: October 26, 2022
Proof of publication required

Bidder's Checklist

Bidders are instructed to complete and return the following forms in order for their bids to be complete. Failure to return the following items may result in your bid being declared “non-responsive.”

1. _____ Bid Item Schedule
2. _____ Bidder Information Sheets
3. _____ Subcontractor Information Form (5% list due with bid submittal)
4. _____ Acknowledgement and Execution Form
5. _____ Certification Regarding Debarment
6. _____ “Certificate of Eligibility” (Local Preference) - If bid exceeds \$250,000 and Contractor wishes to potentially apply their preference.
7. _____ Bid Bond
8. _____ Signed Bid Addenda (if applicable)

**CITY OF SPARKS
NUGGET EVENTS CENTER FORECOURT
BID # 22/23-009 / PWP #WA-2023-077**

PRICES must be valid for 90 calendar days after the bid opening.

COMPLETION of this project is expected **PURSUANT TO CONTRACT DOCUMENTS**.

BIDDER acknowledges receipt of _____ Addenda.

Bidder Name

(signature)

Removal Items

Item No.	Quantity	Unit	Description	Unit Price	Total Price
D1	150	LF	Sawcutting to match existing concrete:	\$ _____/LF	\$ _____
D2	16,800	SF	Remove and dispose of existing concrete subslab, aggregate and pavers.	\$ _____/SF	\$ _____
D3	10	EA	Remove and dispose of existing trees and raised planters.	\$ _____/EA	\$ _____
D4	2,250	SF	Clear, grub and dispose of existing landscaping (turf grass)	\$ _____/SF	\$ _____
D5	1	LS	Selective demolition and disposal of existing kiosk materials, as specified.	\$ _____/LS	\$ _____
D6	20	LF	Sawcut, remove and dispose of portion of wall for relocated ticket booth.	\$ _____/LF	\$ _____
D7	6	EA	Remove and return existing pedestrian lights and speakers and provide to owner.	\$ _____/EA	\$ _____
D8	1	EA	Remove and dispose of existing NVEnergy transformer and pad.	\$ _____/EA	\$ _____
D9	1	LS	Remove and dispose of electrical as specified	\$ _____/LS	\$ _____

Installation Items

Item No.	Quantity	Unit	Description	Unit Price	Total Price
C1	1	LS	Field staking / layout	\$ _____/LS	\$ _____
C2	19,460	SF	Clear and grub site	\$ _____/SF	\$ _____
C3	19,460	SF	Rough grading / site balance	\$ _____/SF	\$ _____
C4	19,460	SF	Fine grading	\$ _____/SF	\$ _____
C5	19,460	SF	Erosion control	\$ _____/SF	\$ _____
C6	1	LS	Furnish and install 6" lateral storm drain piping with storm drain connection, complete and in place	\$ _____/LS	\$ _____
C7	1	LS	Relocate existing transformer and service lines, complete and in place.	\$ _____/LS	\$ _____
E1	10	EA	Furnish and install duplex receptacle 20 amp GFCI, wp complete and in place.	\$ _____/EA	\$ _____
E2	3	EA	Furnish and install Receptacle, 50 amp, twist-lock-GFI protected breakers complete and in place.	\$ _____/EA	\$ _____
E3	320	LF	Furnish and install Branch power, 20 amp complete and in place.	\$ _____/LF	\$ _____
E4	550	LF	Furnish and install Branch power, 50 amp complete and in place.	\$ _____/LF	\$ _____
E5	22	EA	Furnish and install Type L1 light fixture complete and in place.	\$ _____/EA	\$ _____
E6	11	EA	Furnish and install Type L2 light fixture complete and in place.	\$ _____/EA	\$ _____
E7	600	LF	Furnish and install Type L3 light fixture complete and in place.	\$ _____/LF	\$ _____
E8	8	EA	Furnish and install Type L4 light fixture complete and in place.	\$ _____/EA	\$ _____
E9	6	LS	Furnish and install edge-lit poster cabinet and frames complete and in place.	\$ _____/LS	\$ _____
E10	1	EA	Furnish and install lighting control panel and associated controls with conditioned enclosure complete and in place.	\$ _____/EA	\$ _____
E11	2	EA	Furnish and install DMX controller complete and in place.	\$ _____/EA	\$ _____
E12	845	LF	Furnish and install lighting control cable for DMX controller complete and in place	\$ _____/LF	\$ _____

E13	815	LF	Furnish and install site lighting branch power, 20 amp, PVC. Trench, backfill and compact, complete and in place.	\$ _____/LF	\$ _____
E14	11	LF	Furnish and install site lighting branch power, 20 amp, EMT complete and in place.	\$ _____/LF	\$ _____
E15	4	EA	Furnish and install Pull box, data DMX and remote drivers for L3-N40 complete and in place.	\$ _____/EA	\$ _____
E16	1	EA	Prepare, furnish and install NVEnergy TX pad complete and in place.	\$ _____/EA	\$ _____
E17	22	LF	Furnish and install feeder, 400 amp, 3P, 3W, PVC complete and in place.	\$ _____/LF	\$ _____
E18	65	LF	Trench, furnish and install 4" PVC conduit plus additional 3" PVC conduit, backfill and compact, complete and in place.	\$ _____/LF	\$ _____
E19	1	LS	Intercept existing speaker circuit extend to new speakers	\$ _____/LS	\$ _____
E20	7	EA	Furnish and install outdoor speakers located in the shade structures complete and in place.	\$ _____/EA	\$ _____
E21	500	LF	Trench, furnish and install 1" PVC conduit, AV system speaker cable plus additional 2" PVC conduit for future use, backfill and compact, complete and in place.	\$ _____/LF	\$ _____
E22	150	LF	Trench, furnish and install 2" PVC conduit, MaxCell, 3-cell mesh sleeve, backfill and compact with additional 2" PVC conduit for future for future use, complete and in place.	\$ _____/LF	\$ _____
E23	1	EA	Furnish and install Lighting control conditioned enclosure	\$ _____/EA	\$ _____
E24	124	CY	Furnish and install concrete encasements (electrical)	\$ _____/CY	\$ _____
E25	1	LS	Electrical and AV testing / commissioning	\$ _____/LS	\$ _____
A1	11	EA	Furnish and install custom prefabricated steel shade structures consisting of curved tube structural steel, flat perforated steel shade canopy, perforated steel side/access panels, miscellaneous steel supports, angles and hinges, footings, and anchorages, complete and in place.	\$ _____/EA	\$ _____
A2	52	SF	Pylon – Furnish and install GFRC base, complete and in place.	\$ _____/SF	\$ _____
A3	40	SF	Pylon – Furnish and install metal flashing, complete and in place.	\$ _____/SF	\$ _____
A4	90	SF	Pylon – Furnish and install metal cladding, including exterior sheathing and weather barrier, complete and in place	\$ _____/SF	\$ _____
A5	1	LS	Pylon – Furnish and install HSS metal frame, complete and in place	\$ _____/LS	\$ _____ Page 6

A6	70	SF	Pylon – Furnish and install new roof framing, vinyl roofing and roof sheathing, and flashing, complete and in place	\$ _____/SF	\$ _____
A7	6	EA	Pylon - Furnish and install metal poster cabinet with framed operable access door, complete and in place. Note that one panel that will be the access to the roof mounted lighting control modules, the other 5 panels are fixed.	\$ _____/EA	\$ _____
A8	1	EA	Pylon – Furnish and install insulated access door with weather barrier	\$ _____/EA	\$ _____
A9	1	LS	Pylon – Miscellaneous blocking, bolts and connections.	\$ _____/LS	\$ _____
L1	10,420	SF	Furnish and install concrete pavers with sand setting bed, polymeric sand joints, subslab and aggregate base, complete and in place.	\$ _____/SF	\$ _____
L2	360	EA	Furnish and install 18” smooth dowels, complete and in place.	\$ _____/EA	\$ _____
L3	3,337	SF	Furnish and install cast-in-place integral colored concrete paving and aggregate base, complete and in place.	\$ _____/SF	\$ _____
L4	60	LF	Furnish and install tactile warning strip, complete and in place.	\$ _____/LF	\$ _____
L5	520	LF	Furnish and install precast concrete seat walls and footings, complete and in place.	\$ _____/LF	\$ _____
L6	40	LF	Furnish and install precast concrete steps and footings, complete and in place.	\$ _____/LF	\$ _____
L7	12	EA	Furnish and install decorative boulders, complete and in place.	\$ _____/EA	\$ _____
L8	1,500	SF	Furnish and install shrubs, ornamental grasses and groundcover, including irrigation, complete and in place.	\$ _____/SF	\$ _____
L9	1,500	SF	Furnish and install decorative rock mulch and geotextile fabric, complete and in place.	\$ _____/SF	\$ _____
L10	4	EA	Furnish and install shade trees, complete and in place.	\$ _____/EA	\$ _____
L11	7	EA	Furnish and install ornamental trees, complete and in place.	\$ _____/EA	\$ _____
L12	180	CY	Amend or install structural planting soil, complete and in place	\$ _____/CY	\$ _____
L13	135	CY	Amend planting soil, complete and in place.	\$ _____/CY	\$ _____
L14	1	LS	Planting soil testing	\$ _____/LS	\$ _____
L15	3,150	SF	Furnish and install synthetic turf and irrigation, complete and in place.	\$ _____/SF	\$ _____

L16	1	EA	Install irrigation controller (furnished by City)	\$ _____/EA	\$ _____
L17	1	EA	Furnish and install new enclosure for existing backflow preventer, complete and in place	\$ _____/EA	\$ _____
L18	1	EA	Main line point of connection.	\$ _____/EA	\$ _____
L19	220	LF	Furnish and install mainline and additional 2" PVC conduit complete and in place.	\$ _____/LF	\$ _____
L20	2	EA	Furnish and install quick couplers, complete and in place.	\$ _____/EA	\$ _____
G1	1	LS	Traffic control	\$ _____/LS	\$ _____
G2	1	LS	Miscellaneous Irrigation	\$ _____/LS	\$ _____
G3	1	LS	Miscellaneous Architectural / Structural	\$ _____/LS	\$ _____
G4	1	LS	Miscellaneous Removals	\$ _____/LS	\$ _____
G5	1	LS	Mobilization and Demobilization	\$ _____/LS	\$ _____
G6	1	LS	Force account	\$ 100,000	\$ 100,000

1. Note: The force account item G6 shall be included in Total Bid Price.

<p>Total Bid Price</p> <p>\$ _____</p> <p style="text-align: center;">(written total bid price)</p>	<p>\$ _____</p>
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Bidder Information

COMPANY INFORMATION:

Company Name:
Contact Name:
Address:
City:
State / Zip Code:
Telephone Number including area code:
Fax Number including area code:
E-mail:

COMPANY BACKGROUND

- 1) Has your company ever failed to complete any contracts awarded to it? No ___ Yes ___ (If yes, please provide details.)

- 2) Has your company filed any arbitration request or law suits on contracts awarded within the last five years? No ___ Yes ___ (If yes, please provide details.)

- 3) Does your company now have any legal suits or arbitration claims pending or outstanding against it or any officers relating to the performance of a public contract? No ___ Yes ___ (If yes, please provide details.)

- 4) Does your company now employ any officers or principals who were with another firm when that company failed to complete a contract within the last five years? No ___ Yes ___ (If yes, please provide details.)

- 5) Has your company had a contract partially or completely terminated for default (cause) within the past five years? No ___ Yes ___ (If yes, please provide details.)

- 6) Has your company been found non-responsible on a government bid within the last five years? No ___ Yes ___ (If yes, please provide details.)

Bidder Information

CONTRACTOR LICENSE INFORMATION:

Nevada State Contractor's License Number (If Applicable):
License Classification(s):
Limitation(s) of License:
Date Issued:
Date of Expiration:
Name of Licensee:
City, State, Zip Code of Licensee:
Telephone Number of Licensee:

BUSINESS LICENSING INFORMATION All vendors doing business within the City of Sparks are required to obtain and maintain a current business license from the City of Sparks prior to commencement of work (Sparks Municipal Code Section 5.08.020A). Vendor(s) awarded a contract resulting from this bid shall be required to obtain a current business license if they do not already hold one.

City of Sparks Business License Number:
Date Issued:
Date of Expiration:
Name of Licensee:
City, State, Zip Code of Licensee:
Telephone Number of Licensee:
Taxpayer Identification Number:

Bidder Information

DISCLOSURE OF PRINCIPALS:

a) Individual and/or Partnership:

Owner 1) Name:
Address:
City, State, Zip Code:
Telephone Number:
Owner 2) Name:
Address:
City, State, Zip Code:
Telephone Number:
Other 1) Title:
Name
Other 2) Title:
Name:

b) Corporation:

State in which Company is Incorporated:
Date Incorporated:
Name of Corporation:
Address
City, State, Zip Code:
Telephone Number:
President's Name:
Vice-President's Name:
Other 1) Name:
Title:

Awarded Contract Information

If your company is determined to be the awardee of the contract for this scope of work, the contract form for the work will be routed via electronic means. Therefore, please identify the authorized individual that will be signing the resulting contract. Presumably this will be the company owner or corporate officer authorized to bind the company for future work.

COMPANY INFORMATION:

Company Name:
Authorized Name:
Title:
Individual E-Mail Address:
Telephone Number including area code:
Mailing Address:

**SUBCONTRACTOR DETAIL
SUBCONTRACTORS EXCEEDING FIVE PERCENT OF BID AMOUNT**

INSTRUCTIONS: Per NRS 338.141, Bidder submits the following names of First-Tier Subcontractors who will provide to Bidder labor or a portion of the Work or improvements for which Subcontractor will be paid an amount exceeding five percent (5%) of the Bid Price. The Bidder shall list the name of a Subcontractor for each portion of the Work, the value of which exceeds five percent (5%) of the Bid Price. **If Bidder will perform more than 5% of the Work, BIDDER SHALL ALSO LIST HIS NAME and description of the work that the prime contractor will perform in the space provided below.**

Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of Work:		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of Work:		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of Work:		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of Work:		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of Work:		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of Work:		

Bidder Name: _____

Authorized Signature: _____

SUBCONTRACTOR DETAIL
SUBCONTRACTORS EXCEEDING ONE PERCENT OF BID AMOUNT OR \$50,000

INSTRUCTIONS: In compliance with NRS 338.141, Bidder submits the following names of First-Tier Subcontractors who will provide to Bidder labor or a portion of the Work or improvements for which Subcontractor will be paid an amount exceeding one percent (1%) of the Bid or \$50,000, whichever is greater.

Since all Subcontractors listed on the Bidder's 5% Subcontractor Information Form are over 1% of the Bid amount, those Subcontractors shall automatically be deemed incorporated into this 1% Subcontractor Information form and need not be re-listed below.

Information provided must be submitted within two (2) hours after the completion of the opening of the bids (Per NRS 338.141). Bidder shall enter "NONE" under "Name of Subcontractor" if not utilizing subcontractors exceeding this amount. This form must be complete in all respects. If, additional space is needed, attach a separate page. The bidder may elect to submit this information with the bid proposal and, in that case, the bidder will be considered as having submitted this information within the above two hours.

Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of Work:		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of Work:		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of Work:		
Name of Subcontractor	Address	
Phone	Nevada Contractor License #	Limit of License
Description of Work:		

Bidder Name: _____ **Authorized Signature:** _____

CITY OF SPARKS ACKNOWLEDGMENT AND EXECUTION:

STATE OF _____)
) SS
County of _____)

_____(Name of Principal) being first duly sworn, deposes and says: That he/she is the Bidder, or authorized agent of the Bidder for whom the aforesaid described work is to be performed by; that he/she has read the Plans, Specifications, and related documents including but not limited to, any addenda issued and understands the terms, conditions, and requirements thereof; that if his/her bid is accepted that he/she agrees to furnish and deliver all materials except those specified to be furnished by the City of Sparks (Owner) and to do and perform all work for the **NUGGET EVENTS CENTER FORECOURT, Bid # 22/23-009**, together with incidental items necessary to complete the work to be constructed and/or services to be provided in accordance with the Specifications, Plans, and Contract Documents annexed hereto.

TO THE CONTRACTS AND RISK MANAGER OF THE CITY OF SPARKS:

The undersigned, as Bidder, declares that the only persons or parties interested in this proposal, as principals, are those named herein, the Bidder is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid: that this proposal is made without collusion with any other person, firm or corporation; that he/she has carefully examined the location of the proposed work; the proposed form of Contract, the Contract Provisions, Plans, Specifications and Contract Documents incorporated therein referred to and made part thereof; that he/she proposes and agrees if this proposal is accepted, that he/she will contract with the City of Sparks in the form of the Contract prescribed, to provide all necessary machinery, tools, apparatus and other means of construction, and to do all the work and furnish all the materials specified in the Contract and annexed Contract Provisions, Plans and Specifications, in the manner and time prescribed and according to the requirements of the Project Representative as therein set forth, it being understood and agreed that the quantities shown herein are approximate only and are subject to increase or decrease, and that he/she will accept, in full, payment therefore the indicated prices.

(Printed Name of Contractor/Bidder) Contractor/Bidder: _____
BY: _____
Firm: _____
Address: _____
City: _____
State / Zip Code: _____
Telephone Number: _____
Fax Number: _____
E-mail Address: _____
(Signature of Principal) Signature: _____
DATED this _____ day of _____, 2022.

State of Nevada)
) SS.
County of _____)

On this _____ day of _____, in the year 2022, before me,

_____/Notary Public, personally appeared _____ Personally known to me (or proved
to me on the basis of satisfactory evidence) to be the person whose name is subscribed to this instrument, and acknowledged that he (she) executed it. WITNESS my hand and official seal.

Notary's Signature: _____ My commission Expires: _____

**CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER
RESPONSIBILITY MATTERS**

(This form to be signed and returned at the time of bid)

This certification is required by the Federal Regulations Implementing Executive Order 12549, Debarment and Suspension, 45 CFR Part 93, Government-wide Debarment and Suspension, for the Department of Agriculture (7 CFR Part 3017), Department of Labor (29 CFR Part 98), Department of Education (34 CFR Parts 85, 668, 682), Department of Health and Human Services (45 CFR Part 76).

The prospective bidder, _____ certifies to the best of its knowledge and belief that it and its principals:

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- (b) Have not within a three year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- (c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (b) of this certification; and
- (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award. Any exceptions provided will not necessarily result in denial of award, but will be considered in determining bidder responsibility and whether or not the City will enter into contract with the party. For any exception noted, indicate on an attached sheet to whom it applies, initiating agency, and dates of action. Providing false information may result in criminal prosecution or administrative sanctions.

Typed Name & Title of Authorized Representative

Signature of Authorized Representative

Date

I am unable to certify to the above statement. My explanation is attached.

Signature _____ Date _____

CITY OF SPARKS, NEVADA – 5% Bid Bond

KNOW ALL MEN BY THESE PRESENTS: That we the undersigned _____, as “Principal,” and _____, as “Surety,” are hereby held and firmly bound unto the City of Sparks, Nevada, as “Obligee,” in the penal sum of _____ dollars (\$_____) for the payment of which, well and truly to be made, the Principal and Surety bind themselves, their heirs, executors, and administrators, successors and assigns, jointly and severally, by this instrument. The condition of the obligation of this bid bond is as follows:

WHEREAS, NRS 332.105 authorizes local governments to require bid bonds to insure execution and proper performance of the Contract and the Bonding Company has an “A” or better rating with Moody’s or A.M. Best and T-Listed with the U.S. Treasury Department;

AND, WHEREAS, the Principal has submitted a bid for Bid # **22/23-009**, PWP # **WA-2023-077**, for the **NUGGET EVENTS CENTER FORECOURT**.

NOW, THEREFORE,

- (a) If said Bid shall be rejected; or
- (b) If said Bid shall be accepted and the Principal shall execute and deliver the contract in the bid documents (“Contract”) to Obligee in accordance with the terms of the bid documents, and give such bond or bonds as may be specified in the bid or contract documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or
- (c) If the Principal shall pay to the Obligee the full amount of the bid bond as a penalty irrespective of the Obligee’s actual damages in the event of the failure of the Principal to enter into such Contract and give such bond or bonds,

then, this obligation shall be null and void. Otherwise it shall remain in full force and effect, it being expressly understood and agreed that the liability of the Surety (but not of the Principal) for any and all claims hereunder shall, in no event, exceed the penal amount of the obligation as herein stated.

The Surety, for the consideration for which this bond was executed, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the Obligee may accept such bid, and hereby waives notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and the Surety has caused their seal to be hereto affixed and these present to be signed by their proper officers.

Signed, Sealed and dated: _____

Principal
By: _____

Surety
By: _____

GENERAL CONDITIONS

General Conditions



GENERAL CONDITIONS

Please Read Carefully

These Provisions Are a Part of Your Bid and any Contract Awarded

Scope of Bid/Proposal: Bids/Proposals are hereby requested for **NUGGET EVENTS CENTER FORECOURT**, as per specifications herein.

The bidder agrees that:

- A. Bidder has carefully examined the specifications, and all provisions relating to the item(s) to be furnished or the work to be done; understands the meaning, intent, and requirements; and
- B. Bidder will enter into a written contract and furnish the item(s) or complete the work in the time specified, and in strict conformity with the City of Sparks specifications for the prices quoted.

Note: Bidder is defined as any individual, partnership, or corporation submitting a bid, proposal, or quotation in response to a request for bid (RFB), request for proposal (RFP), request for information (RFI) or request for quotation (RFQ). A bidder may also be referred to as a bidder, contractor, supplier or vendor.

The use of the title "Bidder," "Vendor", "Contractor" or "Consultant" within this solicitation document and any resulting contract shall be deemed interchangeable and shall refer to the person or entity with whom the City of Sparks is soliciting and/or contracting for the service or product referenced within the bid document.

1. Prices:

All prices and notations must be in ink or typewritten. Mistakes may be crossed out and corrections typed or written with ink adjacent to the error. Bids shall indicate the unit price extended to indicate the total price for each item bid. Any difference between the unit price correctly extended and the total price shown for all items bid shall be resolved in favor of the unit prices. Bidders are encouraged to review all prices prior to bid submittal, as withdrawal or correction may not be permitted after the bid has been opened.

2. Firm Prices:

Prices on bid shall be firm prices not subject to escalation unless otherwise provided for in the specifications. In the event the specifications provide for escalation, the maximum limit shall be shown, or the bid shall not be considered. In the event of a decline in market price below a price bid, the City of Sparks shall receive the benefit of such decline.

3. Items Offered:

If the item offered by the bidder has a trade name, brand and/or catalog number, such shall be stated in the bid. If the bidder proposes to furnish an item of a manufacturer or vendor other than that mentioned on the face hereof, bidder must specify maker, brand, quality, catalog number, or other trade designation. Unless such is noted on the bid form, it will be deemed that the item offered is that designated even though the bid may state "or equal".

4. Brand Names:

Whenever reference to a specific brand name is made by the City, it is intended to describe a component that has been determined to best meet operational, performance, or reliability standards of the City, thereby incorporating these standards by reference within the specifications. These specifications are not meant to limit the vendor; they are guidelines to minimum qualifications. The bidder shall indicate their compliance or non-compliance for each line of the specification. Any deviations from the specifications or where submitted literature does not fully support the meaning of the specifications must be clearly cited in writing by the bidder.

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An equivalent (“or equal”) may be offered by the bidder, subject to evaluation and acceptance by the City. It is the bidder’s responsibility to provide, at bidder’s expense, samples, test data, or other documentation the City may require to fully evaluate and determine acceptability of an offered substitute. The City reserves the sole right to reject a substituted component that will not meet or exceed City standards.

5. Samples:

Samples may be required for bid evaluation and testing purposes. Bidders shall agree to provide samples upon request and at no additional cost to the City.

6. Withdrawal of Bids:

Bids may be withdrawn by written or facsimile notice received prior to the exact hour and date specified for receipt of bid. A bid may also be withdrawn in person by a bidder, or bidder’s authorized representative, prior to the exact hour and date set for receipt of bids. Telephone withdrawals are not permitted.

7. Late Bids, Modifications, or Withdrawals:

Bids, modifications of bids, or bid withdrawals received after the exact time and date specified for receipt will not be considered.

8. Mistake in Bid:

- (a) If the bidder discovers a mistake in bid prior to the hour and date specified for receipt of bid, bidder may correct the mistake by withdrawing the bid in accordance with Item 7 above and resubmit prior to the stated bid deadline.
- (b) If within seventy-two hours of the bid closing and prior to the issuance of a purchase order or a contract, the apparent low bidder discovers a mistake in bid of a serious and significant nature, bidder may request consideration be given to withdrawing the bid. The mistake must be evident and provable. The right is reserved by the City to reject any and all requests for withdrawal of bids. The decision of the Purchasing Manager is final as regards acceptance or rejection of requests for withdrawal after closing of bids.
- (c) A mistake in bid cannot be considered once a purchase order or contract is issued.

9. Signature:

All bids shall be signed and the title and firm name indicated. A bid by a corporation shall be signed by an authorized officer, employee or agent with his or her title.

10. Exceptions:

A bidder deviating from specifications must specify any and all deviation(s). Failure to note said exceptions shall be interpreted to convey that the bidder shall propose to perform in the manner described and/or specified in this bid solicitation. If exception(s) are taken or alternatives offered, complete descriptions must be shown separately.

11. Confidential Information:

Any information deemed confidential or proprietary should be clearly identified by the bidder as such. It may then be protected and treated with confidentiality only to the extent permitted by state law. Otherwise the information shall be considered a public record. Information or data submitted with a bid will not be returned.

12. Quality:

Unless otherwise required in the specifications, all goods furnished shall be new and unused.



13. Litigation Warranty:

The bidder, by bidding, warrants that bidder is not currently involved in litigation or arbitration concerning the materials or bidder's performance concerning the same or similar material or service to be supplied pursuant to this contract of specification, and that no judgments or awards have been made against bidder on the basis of bidder's performance in supplying or installing the same or similar material or service, unless such fact is disclosed to the City in the bid. Disclosure may not disqualify the bidder. The City reserves the right to evaluate bids on the basis of the facts surrounding such litigation or arbitration and to require bidder to furnish the City with a surety bond executed by a surety company authorized to do business in the State of Nevada and approved by The City of Sparks in a sum equal to one hundred percent (100%) of the contract price conditional on the faithful performance by bidder of the contract in the event the bid is awarded to bidder, notwithstanding the litigation or arbitration.

14. Royalties, Licenses and Patents:

Unless otherwise specified, the bidder shall pay all royalties, license and patent fees. The bidder warrants that the materials to be supplied do not infringe any patent, trademark or copyright and further agrees to defend any and all suits, actions and claims for infringement that are brought against the City, and to defend, indemnify and hold harmless the City from all loss or damages, whether general, exemplary or punitive, as a result of any actual or claimed infringement asserted against the City, the bidder or those furnishing material to bidder pursuant to this contract.

15. Performance Standards:

Performance of work and acceptability of equipment or materials supplied pursuant to any contract or award shall be to the satisfaction and full discretion of the City.

16. Americans with Disabilities Act (ADA) Standards:

Bidders shall be required to comply with current ADA Standards in preparing their bids and executing work required under any contract resulting from this bid. Completed work must comply with current ADA Standards.

17. Warranties:

(a) Unless otherwise specified, all workmanship, material, labor or equipment provided under the contract shall be warranted by bidder and/or manufacturer for a minimum of twelve (12) months after acceptance by City. Greater warranty protection will be accepted. Lesser warranty protection must be indicated by bidder on the bid proposal as an exception.

(b) Bidder shall be considered primarily responsible to the City for all warranty service, parts and labor applicable to the goods or equipment provided by bidder under this bid or award, irrespective of whether bidder is an agent, broker, fabricator or manufacturer's dealer. Bidder shall be responsible for ensuring that warranty work is performed at a local agency or facility convenient to City and that services, parts and labor are available and provided to meet City's schedules and deadlines. If required and defined within the Scope of Work, the Bidder will post a performance bond after contract award to guarantee performance of these obligations. Bidder may establish a service contract with a local agency satisfactory to City to meet this obligation if bidder does not ordinarily provide warranty service.

18. Addenda:

The effect of all addenda to the bid documents shall be considered in the bid, and said addenda shall be made part of the bid documents and shall be returned with them. Before submitting a bid, each bidder shall ascertain

General Conditions



whether or not any addenda have been issued, and failure to acknowledge any such addenda may render the bid invalid and result in its rejection.

All potential bidders are responsible for monitoring the City website regarding the availability of new bid documents or addenda (where applicable). The City of Sparks will not be responsible for the results of any potential failures in automatic notification systems to potential bidders or plan holders with respect to these documents and will not adjust bid schedules or requirements due to any potential failures of those systems. It is the responsibility of all potential bidders/responders to monitor the Purchasing Division's website for any changing information prior to submitting their bid/proposal. The City of Sparks will not be responsible for the timeliness or completeness of information provided by any 3rd party bid listing or re-selling service.

19. Specifications to Prevail:

The detailed requirements of the Specifications, Scope of Work or Special Conditions shall supersede any conflicting reference in these General Conditions or the stated language on the City of Sparks Standard Purchase Order that are in conflict therewith.

20. Taxes:

The City is exempt from State, City and County Sales Taxes per NRS 372.325. The City will furnish Exemption Certificates for Federal Excise Tax when applicable. The successful bidder shall pay all taxes, levies, duties and assessments of every nature, which may be applicable to any work or materials under this Contract. The Contract Sum and any agreed variations thereof shall include all taxes imposed by law. The successful bidder shall make any and all payroll deductions required by law. The successful bidder herein indemnifies and holds the City harmless from any liability on account of any and all such taxes, levies, duties, assessments and deductions.

21. Prevailing Wages:

Bidder is responsible for complying with all applicable local, State and Federal wage laws, whether or not specifically cited in this bid document.

Per NRS Sections 338.020 through 338.090, certain projects defined as "public works" require the payment of the prevailing wage as determined by the Labor Commissioner. Generally speaking, projects/contracts for construction of a public work valued at less than \$100,000 are exempt from the prevailing wage requirement (NRS 338.080). Bidder shall be fully aware of the prevailing wage requirements of the State of Nevada as detailed in NRS Chapter 338 and price their bid response accordingly. Further information concerning Prevailing Wage rates can be found at:

https://labor.nv.gov/PrevailingWage/Public_Works_Prevailing_Wages/

Federal "Davis Bacon" wages may be applicable if the funding for the project includes Federal funds. These requirements are detailed in the "Special Conditions – Federal Requirements" section that will be included in this bid document when such conditions apply. Contractor shall compare the applicable wage rate for each classification used on the project and pay the higher of the two rates (Nevada State Prevailing Wage or Davis Bacon Wage) in each case.

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22. Apprenticeship Utilization Act (This Section IS IS NOT Applicable to this bid):

Senate Bill 207 (Apprenticeship Utilization Act) passed during the 2019 Legislative Session added sections 338.0116 and 338.01165 to the NRS. These new provisions apply to bids for public works where the value exceeds \$100,000.00. In passing SB 207, The Legislature hereby finds and declares that: (1) A skilled workforce in construction is essential to the economic well-being of the State; (2) Apprenticeship programs are a proven method of training a skilled workforce in construction; and (3) Requiring the use of apprentices on the construction of public works will ensure the availability of a skilled workforce in construction in the future for this State

A contractor or subcontractor engaged in **horizontal construction** who employs a worker on a public work pursuant to NRS 338.040 shall use one or more apprentices for at least 3 percent of the total hours of labor worked for each apprenticed craft or type of work to be performed on the public work for which more than three workers are employed.

“Horizontal Construction” means any construction, alteration, repair, renovation, demolition or remodeling necessary to complete a public work, including, without limitation, any irrigation, drainage, water supply, flood control, harbor, railroad, highway, tunnel, airport or airway, sewer, sewage disposal plant or water treatment facility and any ancillary vertical components thereof, bridge, inland waterway, pipeline for the transmission of petroleum or any other liquid or gaseous substance, pier, and any other work incidental thereto. The term does not include vertical construction, the construction of any terminal or other building of an airport or airway, or the construction of any other building.

A contractor or subcontractor engaged in **vertical construction** who employs a worker on a public work pursuant to NRS 338.040 shall use one or more apprentices for at least 10 percent of the total hours of labor worked for each apprenticed craft or type of work to be performed on the public work for which more than three workers are employed.

“Vertical Construction” means any construction, alteration, repair, renovation, demolition or remodeling necessary to complete a public work for any building, structure or other improvement that is predominantly vertical, including, without limitation, a building, structure or improvement for the support, shelter and enclosure of persons, animals, chattels or movable property of any kind, and any other work or improvement appurtenant thereto.

A Public Body/Awarding Body, upon the request of a contractor or subcontractor, **MAY** submit a request for a modification or waiver of the percentage of hours of labor of one or more apprentices prior to (1) the bid advertisement; (2) the bid opening; or (3) the award of the contract if, “Good Cause” exists. The Labor Commissioner may also grant a modification or waiver from the requirements of NRS 338.01165 after work on the public work has commenced.

More information regarding these requirements and forms associated with this act may be found in the section following these General Conditions, labeled “Apprenticeship Requirements.”

23. Conflict of Interest:

No City employee or elected or appointed member of City government, or member of the employee’s immediate family, may participate directly or indirectly in the procurement process pertaining to this bid if they:

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- (a) Have a financial interest or other personal interest that is incompatible with the proper discharge of their official duties in the public interest or would tend to impair their independence, judgment or action in the performance of their official duties.
- (b) Are negotiating for or have an arrangement concerning prospective employment with bidder. The bidder warrants to the best of his knowledge that the submission of the bid will not create such conflict of interest. In the event such a conflict occurs, the bidder is to report it immediately to the Purchasing Manager. For breach or violation of this warranty, the City shall have the right to annul this contract without liability at its discretion, and bidder may be subject to damages and/or debarment or suspension.

24. Disqualification of Bidder:

Any one or more of the following may be considered as sufficient for the disqualification of a prospective Bidder and the rejection of the Bid:

- (a) The Bidder is not responsive or responsible.
- (b) The quality of services, materials, equipment or labor offered does not conform to the approved plans and specifications.
- (c) There is evidence of collusion among prospective Bidders (Participants in such collusion will receive no recognition as Bidders).
- (d) The Bidder lacks the correct contractor's license classification required for the defined scope of work.
- (e) Lack of competency, understanding of the scope of work, adequate machinery, plant and/or equipment as revealed in routine due diligence associated with bid evaluation.
- (f) Unsatisfactory performance record as shown by past work for the City of Sparks, judged from the standpoint of workmanship, progress, and quality of services/goods provided.
- (g) Uncompleted work which, in the judgment of the City of Sparks, might hinder or prevent the prompt completion of additional work, if awarded.
- (h) Failure to pay or satisfactorily settle all bills due for labor and/or material on any contract(s).
- (i) Failure to comply with any requirements of the City of Sparks.
- (j) Failure to list, as required, all subcontractors who will be employed by the Bidder.
- (k) Any other reason determined, in good faith, to be in the best interest of the City of Sparks.

25. Gratuities:

The City may rescind the right of the bidder to proceed under this agreement if it is found that gratuities in the form of entertainment, gifts, cash or otherwise are offered or given by the bidder, or any agent or representative of the bidder, to any officer or employee of the City with the intent of influencing award of this agreement or securing favorable treatment with respect to performance of this agreement.

26. Bidder's Security (This Section IS IS NOT Applicable to this bid):

A bid deposit in an amount equal to at least 5% of the bid may be required as a bid security by the City. The bid security may only be in cash, a cashier's or certified check made payable to the City of Sparks, or a bid bond. If the bid security is a bond, it shall be executed by a surety insurer authorized to issue surety bonds in the State of Nevada. All Bonding Companies must have an "A" rating or better with Moody's or A.M. Best Company, and be included on the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bond and as Acceptable Reinsuring Companies" as published in circular 570 (as amended) by the audit staff, Bureau of Accounts, U.S. Treasury Department. (In other words, the company is T-listed.) The bid security must be executed by the bidder and enclosed with the bid proposal in the sealed bid envelope.



27. Performance and Payment Bonds:

Per NRS 339.025, before any contract, except one subject to the provisions of chapter 408 of NRS, exceeding \$100,000 for any project for the new construction, repair or reconstruction of any public building or other public work or public improvement of any contracting body is awarded to any contractor, he shall furnish to the contracting body the following bonds which become binding upon the award of the contract to the contractor (All Bonding Companies must have an “A” rating or better with Moody’s or A.M. Best Company, and be included on the current list of “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bond and as Acceptable Reinsuring Companies” as published in circular 570 (as amended) by the audit staff, Bureau of Accounts, U.S. Treasury Department. (In other words, the company is T-listed.)):

Performance Bond (This Section IS IS NOT Applicable to this bid):

The Contractor awarded this bid will be required to furnish the City with a surety bond conditioned upon the faithful performance of the contract. This may take the form of a bond executed by a surety company authorized to do business in the State of Nevada and approved by the City of Sparks. The bond shall be in a sum equal to one hundred percent (100%) of the amount of the contract price. Such bond shall be forfeited to the City in the event that bidder receiving the contract shall fail or refuse to fulfill the requirements and all terms and conditions of the contract.

Payment Bond (This Section IS IS NOT Applicable to this bid):

The Contractor awarded this bid will be required to furnish the City with a payment bond. This may take the form of a bond executed by a surety company authorized to do business in the State of Nevada and approved by the City of Sparks. The bond shall be in a sum equal to one hundred percent (100%) of the amount of the contract price. The bond must be solely for the protection of claimants supplying labor or materials to the contractor to whom the contract was awarded, or to any of his subcontractors, in the prosecution of the work provided for in such contract.

28. Indemnification:

To the fullest extent permitted by law, upon award, Contractor shall hold harmless, indemnify, defend and protect City, its affiliates, officers, agents, employees, volunteers, successors and assigns (“Indemnified Parties”), and each of them from and against any and all claims, demands, causes of action, damages, costs, expenses, actual attorney’s fees, losses or liabilities, in law or in equity, of every kind and nature whatsoever (“Claims”) arising out of or related to any act or omission of Contractor, its employees, agents, representatives, or Subcontractors in any way related to the performance of work under this Agreement by Contractor, or to work performed by others under the direction or supervision of Contractor, including but not limited to:

1. Personal injury, including but not limited to bodily injury, emotional injury, sickness or disease, or death to persons;
2. Damage to property of anyone, including loss of use thereof;
3. Penalties from violation of any law or regulation caused by Contractor’s action or inaction;
4. Failure of Contractor to comply with the Insurance requirements established under this Agreement;
5. Any violation by Contractor of any law or regulation in any way related to the occupational safety and health of employees.

In determining the nature of the claim against City, the incident underlying the claim shall determine the nature of the claim, notwithstanding the form of the allegations against City.

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If City's personnel are involved in defending such actions, Contractor shall reimburse City for the time and costs spent by such personnel at the rate charged City for such services by private professionals.

In cases of professional service agreements, requiring professional liability coverage:

If the insurer by which a Consultant is insured against professional liability does not so defend the City and applicable agents and/or staff, and the Consultant is adjudicated to be liable by a trier of fact, the City shall be entitled to reasonable attorney's fees and costs to be paid to the City by the Consultant in an amount which is proportionate to the liability of the of the Consultant.

Nothing in this contract shall be interpreted to waive nor does the City, by entering into this contract, waive any of the provisions found in Chapter 41 of the Nevada Revised Statutes.

29. Insurance:

BIDDERS' ATTENTION IS DIRECTED TO THE INSURANCE REQUIREMENTS BELOW. IT IS HIGHLY RECOMMENDED THAT BIDDERS CONFER WITH THEIR RESPECTIVE INSURANCE CARRIERS OR BROKERS TO DETERMINE IN ADVANCE OF BID SUBMISSION THE AVAILABILITY OF INSURANCE CERTIFICATES AND ENDORSEMENTS AS PRESCRIBED AND PROVIDED HEREIN. IF THE APPARENT LOW BIDDER FAILS TO COMPLY STRICTLY WITH THE INSURANCE REQUIREMENTS, THAT BIDDER MAY BE DISQUALIFIED FROM AWARD OF THE CONTRACT.

The City may, unless otherwise required by law, waive or reduce the insurance requirements itemized here, at the discretion of the city's Contracts and Risk Manager.

Should work be required on City premises or within the public right-of-way, upon award of the contract, the bidder shall provide proof of insurance for the types of coverage, limits of insurance and other terms specified herein, prior to initiation of any services under City, Bid, Proposal or Contract. Coverage shall be from a company authorized to transact business in the State of Nevada and the City of Sparks and shall meet the following minimum specifications:

Contractor shall at its own expense carry and maintain at all times the following insurance coverage and limits of insurance no less than the following or the amount customarily carried by Contractor or any of its subcontractors, whichever is greater. Contractor shall also cause each subcontractor employed by Contractor to purchase and maintain insurance of the type specified herein. All insurers must have AM Best rating not less than A-VII, and be acceptable to the City. Contractor shall furnish copies of certificates of insurance evidencing coverage for itself and for each subcontractor. Failure to maintain the required insurance may result in termination of this contract at City's option. If Contractor fails to maintain the insurance as set forth herein, City shall have the right, but not the obligation, to purchase said insurance at Contractor's expense.

Contractor shall provide proof of insurance for the lines of coverage, limits of insurance and other terms specified below prior to initiation of any services. Coverage shall be from a company authorized to transact business in the State of Nevada and the City of Sparks. Contractor and any of its subcontractors shall carry and maintain coverage and limits no less than the following or the amount customarily carried by Contractor or any of its subcontractors, whichever is greater.

General Conditions



Applicable to this Contract	Insurance Type	Minimum Limit	Insurance Certificate	Additional Insured	Waiver of Subrogation
Yes	General Liability/Umbrella (Excess) Liability	\$2,000,000	✓	✓	✓
Yes	Automobile Liability	\$1,000,000	✓	✓	
Yes	Workers' Compensation	Statutory	✓	N/A	✓
Yes	Employer's Liability	\$1,000,000	✓	N/A	
No	Professional Liability	\$1,000,000	✓	N/A	N/A
No	Pollution Legal Liability	\$1,000,000	✓	N/A	N/A

Commercial General Liability

Contractor shall carry and maintain Commercial General Liability (CGL) and, if necessary to meet required limits of insurance, commercial umbrella/excess liability insurance with a total limit of not less than the limits specified herein.

For contracts that are for the construction or improvement of public facilities, the Contractor shall obtain and maintain products and completed operations liability coverage through the statute of repose after completion of the project. Continuing commercial umbrella coverage, if any, shall include liability coverage for damage to the insured's completed work equivalent to that provided under ISO form CG 00 01.

There shall be no endorsement or modification of the CGL limiting the scope of coverage for liability arising from pollution, explosion, collapse, underground property damage, or damage to the named insured's work unless Subcontractor carries and maintains separate policies providing such coverage and provides Contractor evidence of insurance confirming the coverage.

Minimum Limits of Insurance

\$2,000,000 Each Occurrence Limit for bodily injury and property damage

\$2,000,000 General Aggregate Limit

\$2,000,000 Products and Completed Operations Aggregate Limit

\$10,000 Medical Expense Limit

If Commercial General Liability Insurance or other form with a general aggregate limit is used, it shall be revised to apply separately to this PROJECT or LOCATION.

Coverage Form

Coverage shall be at least as broad as the unmodified Insurance Services Office (ISO) Commercial General Liability (CGL) "Occurrence" form CG 00 01 04/13 or substitute form providing equivalent coverage and shall cover liability arising from premises, operations, independent contractors, products-completed operations, personal and advertising injury, and liability assumed under an insured contract (including the tort liability of another assumed in a business contract).



Additional Insured

City, its officers, agents, employees, and volunteers are to be included as insureds using the applicable ISO additional insured endorsement(s) or substitute forms providing equivalent coverage, in respects to damages and defense arising from: activities performed by or on behalf of Contractor, including the insured's general supervision of Contractor; products and completed operations of Contractor; premises owned, occupied, or used by Contractor. The coverage shall contain no special limitations on the scope of protection afforded to City, its officers, employees, or volunteers. Additional insured status for City shall apply until the expiration of time within which a claimant can bring suit per applicable state law.

Primary and Non-Contributory

Contractor's insurance coverage shall apply as primary insurance with respect to any other insurance or self-insurance programs afforded to City, its officers, agents, employees, and volunteers. There shall be no endorsement or modification of the CGL to make it excess over other available insurance; alternatively, if the CGL states that it is excess or pro rata, the policy shall be endorsed to be primary with respect to the additional insured. Any insurance or self-insurance maintained by City, its officers, employees, or volunteers shall be excess of Contractor's insurance and shall not contribute with it in any way.

Waiver of Subrogation

Contractor waives all rights against City and its agents, officers, directors and employees for recovery of damages to the extent these damages are covered by the commercial general liability or commercial umbrella liability insurance maintained pursuant to this agreement. Insurer shall endorse CGL policy as required to waive subrogation against the City with respect to any loss paid under the policy.

Endorsements

Policy forms or endorsements are required confirming coverage for all required additional insureds. The forms or endorsements for CGL shall be at least as broad as the unmodified ISO additional insured endorsement CGO 20 10 07/04 and CG 20 37 07/04 or substitute forms providing additional insured coverage for products and completed operations.

A waiver of subrogation in favor of City shall be endorsed to the policy using an unmodified Waiver of Transfer of Rights of Recovery of Others to Us ISO CG 24 04 05 09, or a substitute form providing equivalent coverage.

Electronic Data Liability

If any underground work will be performed, Contractor shall maintain electronic data liability insurance applicable to the Project and insuring against liability arising out of the loss of, loss of use of, damage to, corruption of, inability to access, or inability to manipulate electronic data. This coverage shall be maintained with a limit of liability of not less than \$1,000,000 and provide coverage at least as broad as electronic data liability coverage form CG 04 37 (or substitute form providing equivalent coverage).

Railroad Protective Liability

For any construction or demolition work within fifty (50) feet of a railroad, Contractor shall maintain Railroad Protective Liability insurance on behalf of and in the name of the railroad, as named insured, with a limit of \$6,000,000 per occurrence or higher limit if required by the railroad. Contractor shall also ensure that any exclusions pertaining to the indemnification of a railroad are removed from its CGL policy or that ISO form CG 24 17 (Contractual Liability-Railroads Endorsements) is included in the coverage.

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Business Automobile Liability

Minimum Limits of Insurance

\$1,000,000 Combined Single Limit per accident for bodily injury and property damage or the limit customarily carried by Contractor, whichever is greater. No aggregate limit may apply. Coverage may be combined with Excess/Umbrella Liability coverage to meet the required limit.

Coverage Form

Coverage shall be at least as broad as the unmodified Insurance Services Office (ISO) Business Automobile Coverage form CA 00 01 10/13, CA 00 25 10/13, CA 00 20 10/13 or substitute form providing equivalent coverage. Such insurance shall cover liability arising out of any auto (including owned, hired, and non-owned autos).

Pollution liability coverage at least as broad as that provided under the ISO pollution liability—broadened coverage for covered autos endorsement (CA 99 48) shall be provided, and the Motor Carrier Act endorsement (MCS 90) shall be attached for all contracts involving transportation of “hazardous material” as this term is defined by applicable law, including, but not limited to, waste, asbestos, fungi, bacteria and mold.

Additional Insured

City, its officers, agents, employees, and volunteers are to be included as insureds with respect to damages and defense arising from the ownership, maintenance or use of automobiles owned, leased, hired, or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to City, its officers, employees, or volunteers. Additional insured status for City shall apply until the expiration of time within which a claimant can bring suit per applicable state law.

Endorsements

A policy endorsement is required listing all required additional insureds. The endorsement for Business Automobile Liability shall be at least as broad as the unmodified ISO CA 20 48 10/13 or a substitute form confirming City’s insured status for Liability Coverage under the Who Is An Insured Provision contained in Section II of the coverage form ISO CA 00 01 10/13.

Waiver of Subrogation.

Contractor waives all rights against City, its officers, agents, employees, and volunteers for recovery of damages to the extent these damages are covered by the commercial general liability or commercial umbrella liability insurance maintained pursuant to this agreement. Contractor’s insurer shall endorse policy to waive subrogation against City with respect to any loss paid under the policy.

Workers’ Compensation and Employer’s Liability

Contractor shall carry and maintain workers’ compensation and employer’s liability insurance meeting the statutory requirements of the State of Nevada, including but not limited to NRS 616B.627 and NRS 617.210 or provide proof that compliance with the provisions of Nevada Revised Statutes Chapters 616A-D and all other related chapters is not required. It is understood and agreed that there shall be no coverage provided for Contractor or any Subcontractor of the Contractor by the City. Contractor agrees, as a precondition to the performance of any work under this Agreement and as a precondition to any obligation of the City to make any payment under this Agreement to provide City with a certificate issued by an insurer in accordance with NRS 616B.627 and with a certificate of an insurer showing coverage pursuant to NRS 617.210.

It is further understood and agreed by and between City and Contractor that Contractor shall procure, pay for and maintain the above-mentioned coverage at Contractor's sole cost and expense.

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Should Contractor be self-funded for workers’ compensation and employer’s liability insurance, Contractor shall so notify City in writing prior to the signing of this Contract. City reserves the right to approve said retentions, and may request additional documentation, financial or otherwise, for review prior to the signing of this Contract.

Upon completion of the project, Contractor shall, if requested by City, provide a Final Certificate for itself and each Subcontractor showing that Contractor and each Subcontractor had maintained the required Workers Compensation and Employer’s Liability by paying all premiums due throughout the entire course of the project.

Nevada law allows the following to reject workers’ compensation coverage if they do not use employees or subcontractors in the performance of work under the contract:

- Sole proprietors (NRS 616B.627 and NRS 617.210)
- Unpaid officers of quasi-public, private or nonprofit corporations (NRS 616B.624 and NRS 617.207)
- Unpaid managers of limited liability companies (NRS 616B.624 and NRS 617.207)
- An officer or manager of a corporation or limited liability company who owns the corporation or company (NRS 616B.624 and NRS617.207)

If a contractor has rejected workers’ compensation coverage under applicable Nevada law, the contractor must indicate the basis for the rejection of coverage and complete, sign and have notarized an Affidavit of Rejection of Coverage. The Affidavit must be completed, signed and notarized prior to performance of any work.

Minimum Limits of Insurance

Workers’ Compensation:	Statutory Limits
Employer’s Liability:	\$1,000,000 Bodily Injury by Accident – Each Accident
	\$1,000,000 Bodily Injury by Disease – Each Employee
	\$1,000,000 Bodily Injury by Disease – Policy Limit

Coverage Form

Coverage shall be at least as broad as the unmodified National Council on Compensation Insurance (NCCI) Workers Compensation and Employer’s Liability coverage form WC 00 00 07/11 or substitute form providing equivalent coverage.

OTHER INSURANCE COVERAGES (IF APPLICABLE)

Professional Liability Insurance (if Applicable) \$1,000,000 each claim limits of liability or whatever limit is customarily carried by the Contractor, whichever is greater, for design, design-build or any type of professional services. If coverage is required on a claims-made or claims-made and reported basis, any applicable retroactive or pending & prior litigation dates must precede the effective date of this contract. Continuous coverage shall be maintained, or an extended reporting period shall be obtained for a period of at least three (3) years following completion of the project.

Contractors Pollution Liability Insurance (If Applicable)- \$1,000,000 per occurrence and \$2,000,000 aggregate or whatever amount is acceptable to the City for any exposure to “hazardous materials” as this term is defined in applicable law, including but not limited to waste, asbestos, fungi, bacterial or mold.

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Coverage shall apply to bodily injury; property damage, including loss of use of damaged property or of property that has not been physically injured; cleanup costs; and defense, including costs and expenses incurred in the investigation, defense, or settlement of claims.

City shall be included as an insured under Contractor's pollution liability insurance.

If coverage is required on a claims-made or claims-made and reported basis, any applicable retroactive or pending & prior litigation dates must precede the effective date of this contract. Continuous coverage shall be maintained, or an extended reporting period shall be obtained for a period of at least three (3) years following completion of the project.

If the scope of services as defined in this contract includes the disposal of any hazardous materials from the job site, Contractor must furnish to City evidence of pollution liability insurance maintained by the disposal site operator for losses arising from the insured facility accepting waste under this contract. Coverage certified to the City under this section must be maintained in minimum amounts of \$1,000,000 per loss, with an annual aggregate of at least \$2,000,000.

Lower tier sub-subcontractors, Truckers, Suppliers: Evidence confirming lower tier subcontractors, truckers and suppliers are maintaining valid insurance prior to beginning work on the project to meet the requirements set forth herein on Subcontractor, including but not limited to all additional insured requirements of Subcontractor.

ALL COVERAGES

Coverage shall not be suspended, voided, canceled, or non-renewed by either CONTRACTOR or by the insurer, reduced in coverage or in limits except after thirty (30) days' prior written notice has been given to CITY except for ten (10) days' notice for nonpayment of premium.

DEDUCTIBLES AND RETENTIONS

Any deductibles or self-insured retentions that exceed \$100,000.00 per occurrence or claim must be declared to and approved by the City's Contracts and Risk Manager and prior to signing this Contract. City is entitled to request and receive additional documentation, financial or otherwise, prior to giving its approval of the deductibles and self-insured retentions. Any changes to the deductibles or self-insured retentions made during the term of this Contract or during the term of any policy must be approved by City's Contracts and Purchasing Manager prior to the change taking effect. Contractor is responsible for any losses within deductibles or self-insured retentions.

OTHER INSURANCE PROVISIONS

Should City and Contractor agree that higher coverage limits are needed warranting a project policy, project coverage shall be purchased and the premium for limits exceeding the above amount may be borne by City. City retains the option to purchase project insurance through Contractor's insurer or its own source.

Any failure to comply with reporting provisions of the policies shall not affect coverage provided to City, its officers, agents, employees, or volunteers.

ACCEPTABILITY OF INSURERS

Insurance is to be placed with insurers with a Best's rating of no less than A-VII and acceptable to the City. City, with the approval of the Risk Manager, may accept coverage with carriers having lower Best's ratings upon review of financial information concerning Contractor and insurance carrier. City reserves the right to

General Conditions



require that Contractor's insurer be a licensed and admitted insurer in the State of Nevada, or meet any applicable state and federal laws and regulations for non-admitted insurance placement.

VERIFICATION OF COVERAGE

Contractor shall furnish City with certificates of insurance and with original endorsements affecting coverage required by this contract. The certificates and endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf.

Prior to the start of any Work, Contractor must provide the following documents to City of Sparks, Attention: Purchasing Division, P.O. Box 857, Sparks, NV 89432-0857:

- A. Certificate of Insurance.** Contractor must provide a Certificate of Insurance form to the City of Sparks to evidence the insurance policies and coverage required of Contractor.
- B. Additional Insured Endorsements.** An original Additional Insured Endorsement, signed by an authorized insurance company representative, must be submitted to the City of Sparks, by attachment to the Certificate of Insurance, to evidence the endorsement of the City of Sparks as additional insured.
- C. Policy Cancellation Endorsement.** Except for ten (10) days' notice for non-payment of premium, each insurance policy shall be endorsed to specify that without thirty (30) days prior written notice to the City of Sparks, the policy shall not be suspended, voided, cancelled or non-renewed, and shall provide that notices required by this paragraph shall be sent by certified mailed to the address specified above. A copy of this signed endorsement must be attached to the Certificate of Insurance. If endorsements are not available, Contractor shall be responsible to provide prior written notice to City as soon as practicable upon receipt of any notice of cancellation, non-renewal, reduction in required limits or other material change in the insurance required under this Agreement.
- D. Bonds (as Applicable).** Bonds as required and/or defined in the original bid documents.

All certificates and endorsements are to be addressed to the City of Sparks, Purchasing Division and be received and approved by City before work commences. The City reserves the right to require complete certified copies of all required insurance policies at any time.

SUBCONTRACTORS

Contractor shall include all Subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each Subcontractor. All coverages for Subcontractors shall be subject to all the requirements stated herein.

MISCELLANEOUS CONDITIONS

1. Contractor shall be responsible for and remedy all damage or loss to any property, including property of City, caused in whole or in part by Contractor, any Subcontractor, or anyone employed, directed, or supervised by Contractor.
2. Nothing herein contained shall be construed as limiting in any way the extent to which Contractor may be held responsible for payment of damages to persons or property resulting from its operations or the operations of any Subcontractors under it, and such coverage and limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to City in this contract.

General Conditions



3. In addition to any other remedies City may have if Contractor fails to provide or maintain any insurance policies or policy endorsements to the extent and within the time herein required, City may, at its sole option:
 - a. Purchase such insurance to cover any risk for which City may be liable through the operations of Contractor under this Agreement and deduct or retain the amount of the premiums for such insurance from any sums due under the Agreement;
 - b. Order Contractor to stop work under this Agreement and/or withhold any payments which become due Contractor here under until Contractor demonstrates compliance with the requirements hereof; or,
 - c. Terminate the Agreement.
4. If Contractor's liability policies do not contain the standard ISO separation of insureds condition, or a substantially similar clause, they shall be endorsed to provide cross-liability coverage.

30. Safety Program:

Upon award, the Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the work. The Contractor shall take all necessary precautions for the safety of, and shall provide all necessary protection to prevent damage, injury, or loss to:

1. All employees on the work site and all other persons who may be affected thereby.
2. All the work, materials, and equipment to be incorporated therein, whether in storage on or off the site.
3. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

Contractor shall comply with all applicable laws, ordinances, rules, regulations, and others of any public authority having jurisdiction for the safety of persons or property or to protect them from damage, injury, or loss. He shall erect and maintain, as required by existing conditions and progress on the work, all necessary safeguards for safety and protection, including posting danger signs, other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent utilities. Contractor shall comply with OSHA'S Hazard Communication Standards.

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

31. Award of Contract:

- (a) Bids/Proposals will be analyzed and award will be made to the lowest, responsive and responsible bidder whose bid conforms to the solicitation and whose bid is considered to be most advantageous to the City, price and other factors considered. Factors to be considered may include, but are not limited to: bidder's past performance, total unit cost, economic cost analysis, life cycle costs, warranty and quality, maintenance cost, durability, the operational requirements of the City and any other factors which will result in the optimum economic benefit to the City.
- (b) The City reserves the right to reject any item or items, to waive informalities, technical defects and minor irregularities in bids/proposals received; and to select the bid(s) or proposal(s) deemed most advantageous to the City. Should the City elect to waive a right it will not constitute an automatic waiver of that right in the future nor will it impact any other right or remedy. The City may consider bids/proposals submitted on an "all or nothing" basis if the bid/proposal is clearly designated as such.

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- (c) The City reserves the right to award one or more contracts on the bids/proposals submitted, either by award of all items to one bidder or by award of separate items or groups of items to various bidders as the interests of the City may require, unless the bidder clearly specifies otherwise in his bid.
- (d) Upon acceptance by the City of Sparks, the solicitation, bid, proposal, or price quotation and issuance of a purchase order issued to the successful bidder shall be deemed to result in a binding contract incorporating those terms and these General Conditions without further action required by either party. Items are to be furnished as described in the bid and in strict conformity with all instructions, conditions, specifications, and provisions in the complete contract, as defined by this clause or any related integrated agreement.

32. Request for Proposal (RFP) Submittals:

In the case of Request for Proposals (RFP's), it should be noted that the documents submitted by prospective bidders are competitive sealed proposals and not competitive sealed bids. When proposals are opened, prices and other information will not be made public until the proposal is awarded. There shall be no disclosure of any bidder's information to competing bidders prior to the award of the proposal.

By their nature, proposals will include a number of variables that will vary based on the complexity of the product or service addressed within the proposal. Therefore, the evaluation of RFP's and the recommendation for award will not be based on price alone. Selection criteria will be better defined for each scope of work in the Special Conditions section of this bid.

Upon award of the contract, the executed contract and proposals will become public information. Accordingly, each proposal should be submitted on the vendor's most favorable terms from a price and technical standpoint.

33. Bidder Preference Law (This Section IS IS NOT Applicable to this bid):

This project will be bid and awarded under the Provisions(s) of NRS 338.147, which restricts preference given to certain contractors on Public Works Projects. The NRS cited in this section is meant to be a reference only. Each bidder shall acquaint himself with the latest provisions of NRS 338.147.

If the Contract for any Public Works Construction Project is expected to cost \$250,000 or more, then all Contractors wishing to receive benefit of their preference status in the evaluation of bids must submit a copy of their Certificate of Bidder Preference issued by the State Contractor's Board. (Call 775-688-1141 or 775-486-1100 to obtain certification information from the State Contractors Board). Contractors who do not submit a preference certificate at the time of their bid are presumed to have wished not to exercise the benefit of their preference, or do not possess the certificate of eligibility.

To the extent Contractor has sought, qualified and receives a bidding preference on this project, pursuant to Nevada Revised Statutes Chapter 338, Contractor acknowledges and agrees that the following requirements will be adhered to, documented and attained for the duration of the Project:

1. At least 50 percent of the workers employed on the Project (including subcontractors) hold a valid driver's license or identification card issued by the Nevada Department of Motor Vehicles;
2. All vehicles used primarily for the public work will be (a) registered and (where applicable) partially apportioned to Nevada; or (b) registered in Nevada; and
3. The Contractor shall maintain and make available for inspection within Nevada all payroll records

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related to the Project.

Contractor recognizes and accepts that failure to comply with any requirements herein shall be a material breach of the contract and entitle the City of Sparks to liquidated damages in the amount set by statute. In addition, the Contractor recognizes and accepts that failure to comply with any requirements herein may lose its certification for a preference in bidding and/or its ability to bid on any contracts for public works pursuant to NRS Chapter 338.

To the extent Contractor has sought, qualified and receives a bidding preference, and this project has a value of over \$250,000 pursuant to Nevada Revised Statutes Chapter 338, each contract between the contractor, applicant or design-build team and a subcontractor must provide for the apportionment of liquidated damages assessed pursuant to this section if a person other than the Contractor was responsible for the breach of a contract for a public work caused by a failure to comply with a requirement of Items 1-3 within this section. The apportionment of liquidated damages must be in proportion to the responsibility of each party for the breach.

This section shall not be applicable for projects in which some or all of the funding comes from Federal sources.

34. Tie Bids:

Should identical low, responsive and responsible bids be received from two bidders, the City of Sparks Purchasing Manager shall notify all parties involved in the tie and may at his option utilize a coin-flip to determine the low bidder who shall be recommended for award. Or;

Should there be three or more low, responsive and responsible tie bids the Purchasing Manager shall exercise the following tie breaking method, unless another alternative is apparent and prudent: The City of Sparks Purchasing Manager shall set a mutually agreed upon time where, in his office, he shall shuffle a new deck of playing cards and have each bidder's representative cut the cards. The tie bidder who cuts the highest card (with Ace high) shall be recommended for bid award.

35. Appeals/Protests – Bids Only (Not Applicable to Request for Proposals):

A person who submits a bid on a contract may, after the bids are opened and within 5 business days after the date the "Recommendation to Award" is issued by the City, unless otherwise stated in the Special Conditions, file a notice of protest regarding the awarding of the contract. The City's "Recommendation to Award" will be dated and posted on the City's public website within the area where bid notices and bid re-caps are posted (Currently: <http://www.cityofsparks.us/bids>).

- (a) A notice of protest must include a written statement setting forth with specificity the reasons the person filing the notice believes the applicable provisions of law were violated.
- (b) A person filing a notice of protest may be required by the governing body or its authorized representative, at the time the notice of protest is filed, to post a bond with a good and solvent surety authorized to do business in this State or submit other security, in a form approved by the governing body or its authorized representative, to the governing body or its authorized representative who shall hold the bond or other security until a determination is made on the protest. A bond posted or other security submitted with a notice of protest must be in an amount equal to the lesser of:
 - (1) Twenty-five percent of the total value of the bid submitted by the person filing the notice of protest;
 - or
 - (2) Two hundred fifty thousand dollars (\$250,000).

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- (c) A notice of protest filed in accordance with the provisions of this section operates as a stay of action in relation to the awarding of any contract until a determination is made by the governing body or its authorized representative on the protest.
- (d) A person who submits an unsuccessful bid may not seek any type of judicial intervention until the governing body or its authorized representative has made a determination on the protest and awarded the contract.
- (e) A governing body or its authorized representative is not liable for any costs, expenses, attorney's fees, loss of income or other damages sustained by a person who submits a bid, whether or not the person files a notice of protest pursuant to this section.
- (f) If the protest is upheld, the bond posted or other security submitted with the notice of protest must be returned to the person who posted the bond or submitted the security. If the protest is rejected, a claim may be made against the bond or other security by the governing body or its authorized representative in an amount equal to the expenses incurred by the governing body or its authorized representative because of the unsuccessful protest. Any money remaining after the claim has been satisfied must be returned to the person who posted the bond or submitted the security.

36. Documentation:

Due to the time constraints that affect contract performance, all required documents, certificates of insurance and bonds shall be provided to the City within ten (10) calendar days following award or date of request by City, whichever is later. Any failure to comply may result in bid being declared non-responsive and rejected, and at City's option, the bid bond may be attached for damages suffered.

37. Discounts:

- (a) Prompt payment discounts will not be considered in evaluating bids for award. However, offered discounts will be taken if payment is made within the discount period, even though not considered in the evaluation of bids.
- (b) In connection with any discount offered, time will be computed from date of delivery and acceptance, or invoice receipt, whichever is later. Payment is deemed to be made for the purpose of earning the discount on the date of mailing of the City check.
- (c) Any discount offered other than for prompt payment should be included in the net price quoted and not included in separate terms. In the event this is not done, the City reserves the right to accept the discount offered and adjust prices accordingly on the Purchase Order.

38. Seller's Invoice:

Invoices shall be prepared and submitted in duplicate to the address shown on the Purchase Order. Separate invoices are required for each Purchase Order. Invoices shall contain the following information: Purchase Order number, item number, description of supplies or services, sizes, unit of measure, quantity, unit price and extended totals.

39. Inspection and Acceptance:

Inspection and acceptance will be at destination unless specified otherwise, and will be made by the City department shown in the shipping address or other duly authorized representative of the City. Until delivery and acceptance, and after any rejection, risk of loss will be on the bidder unless loss results from negligence of the City.



40. Lost and Damaged Shipments:

Risk of loss or damage to items prior to the time of their receipt and acceptance by the City is upon the bidder. The City has no obligation to accept damaged shipments and reserves the right to return at the bidder's expense damaged merchandise even though the damage was not apparent or discovered until after receipt of the items.

41. Late Shipments:

Bidder is responsible to notify the City department receiving the items and the Purchasing Manager of any late or delayed shipments. The City reserves the right to cancel all or any part of an order if the shipment is not made as promised.

42. Document Ownership:

All technical documents and records originated or prepared pursuant to this contract, including papers, reports, charts, and computer programs, shall be delivered to and become the exclusive property of the City and may be copyrighted by the City. Bidder assigns all copyrights to City by undertaking this agreement.

43. Advertisements, Product Endorsements:

City employees and agencies or organizations funded by the City of Sparks are prohibited from making endorsements, either implied or direct, of commercial products or services without written approval of the City Manager. No bidder may represent that the City of Sparks has endorsed their product or service without prior written approval.

44. Vendor Workplace Policies

No Vendor providing a service, program or activity to the public on behalf of the City shall discriminate against any person because of sex, race, color, creed, national origin or disability. Vendor, if providing a service, program or activity to the public on behalf of the City, shall comply with the Americans with Disability Act and City's policies pursuant thereto when providing said service, program or activity.

The City of Sparks is an Affirmative Action/Equal Opportunity Employer. Bidders shall be cognizant of the requirements for compliance with Executive Order 11246, entitled "Equal Employment Opportunity" as amended by Executive Order 11375 and as supplemented in regulations of the U.S. Department of Labor (41 CFR part 60).

45. Business License Requirement:

All companies doing business with, or within, the City of Sparks are required to obtain and maintain a current business license from the City of Sparks prior to the commencement of work per Sparks Municipal Code Section 5.08.020A. Bidder(s) awarded a contract resulting from this bid shall be required to obtain a current business license if they do not already possess one.

46. City Provisions to Prevail:

Except as indicated in the specifications, the City's standard General Conditions shall govern any contract award. Any standard terms and conditions of bidder submitted by bidder shall not be acceptable to City unless expressly agreed to by the City. The City reserves the right to reject bidder's bid as non-responsive, to consider the bid without bidder's standard terms and conditions, or to require bidder to delete reference to such, as a condition of evaluation or award of the bid. If, after award of contract, bidder (contract vendor) provides materials or services accompanied by new or additional standard terms or conditions, they too shall be considered void and City may require deletion as a further condition of performance by vendor.

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47. Invalid Provisions:

In the event that any one or more of the provisions of this agreement shall be found to be invalid, illegal or unenforceable, the remaining provisions shall remain in effect and be enforceable.

48. Amendments and Modifications:

The Purchasing Manager may at any time, by written order, and without notice to the sureties, make a modification to the contract or an amendment to the Purchase Order, within the general scope of this contract, in (1) quantity of materials or service, whether more or less; (2) drawings, designs, or specifications, where the supplies to be furnished are to be specially manufactured for the City; (3) method of shipment or packing; and (4) place of delivery. If any such change causes an increase or decrease in the cost or the time required for the performance of this contract, an equitable adjustment shall be made by written modification of the contract or amendment to the Purchase Order. Any claim by the bidder for adjustment under this clause must be asserted within 30 calendar days from the notification date.

49. Assignment:

Vendor shall not assign or delegate duties or responsibilities under this agreement, in whole or in part, without prior written approval of the City.

50. Disputes After Award:

Except as otherwise provided in these provisions, any dispute concerning a question of fact arising under this contract which is not disposed of by agreement shall be decided by the Purchasing Manager, who shall reduce this decision to writing and mail a copy to the bidder. The decision of the Purchasing Manager shall be final and conclusive, unless bidder requests arbitration within ten (10) calendar days. Pending final decision of a dispute, the bidder shall proceed diligently with the performance of the contract and in accordance with the Purchasing Manager's decision.

51. Arbitration after Award:

Any and all disputes, controversies or claims arising under or in connection with the contract resulting from this bid, including without limitation, fraud in the inducement of this Contract, or the general validity or enforceability of this Contract, shall be governed by the laws of the State of Nevada without giving effect to conflicts of law principles, may be submitted to binding arbitration before one arbitrator, and shall be conducted in accordance with the Commercial Arbitration Rules of the American Arbitration Association in a private manner in Washoe County, Nevada. This award shall be final and judgment may be entered upon it in any court having jurisdiction thereof. In reaching this final award, the arbitrator shall have no authority to change or modify any provision of this Contract. All other expenses of arbitration shall be borne equally by the parties. All fees, including legal fees, shall be borne by the party who incurred them. All costs of enforcement shall be borne by the losing party. Each party shall have the right to discovery in accordance with the Nevada Rules of Civil Procedure.

52. Lawful Performance:

Vendor shall abide by all Federal, State and Local Laws, Ordinances, Regulations, and Statutes as may be related to the performance of duties under this agreement. In addition, all applicable permits and licenses required shall be obtained by the vendor, at vendor's sole expense.

53. Annual Appropriation of Funds:

Multi-year term supply and service contracts and leases are subject to annual appropriation of funds by the City Council. The City plans and makes appropriations to the City Budget with respect to a fiscal year that starts July 1st and ends June 30th of each year. Payments made under term contracts and leases are considered items

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of current expense. Purchase Orders are funded when issued; therefore, they are current expense items and are not subject to any subsequent appropriation of funds.

Continuance of a multi-year contract beyond the limits of funds available shall be contingent upon appropriation of the requisite funds in the ensuing fiscal year and the termination of this contract due to lack of appropriation shall be without penalty.

54. Extension:

When in the City's best interest, this agreement may be extended on a daily, month-to-month, or annual basis by mutual agreement of both parties. Services and/or materials received under an extension shall be in accordance with pricing, terms, and conditions, as described herein.

55. Termination:

The City may terminate this agreement and be relieved of any consideration to the vendor should vendor fail to perform in the manner required. Furthermore, the City may terminate this agreement for any reason without penalty upon giving thirty (30) days written notice to the vendor. In the event of termination, the full extent of City liability shall be limited to an equitable adjustment and payment for materials and/or services authorized by and received to the satisfaction of the City prior to termination.

56. Venue:

This agreement shall be governed by and interpreted according to the laws of the State of Nevada, and venue for any proceeding shall be in Washoe County.

Special Conditions and Specifications (Specific to Project)

In instances where the Special Conditions conflict with the General Conditions, the Special Conditions will prevail with respect to that instance or item(s).

**SPECIAL PROVISIONS
NUGGET EVENTS CENTER FORECOURT
BID #22/23-009 / PWP #WA-2023-077**

These Special Provisions supplement and modify the "Standard Specifications for Public Works Construction" Latest Edition, and adopted by the City of Sparks, Nevada. All the requirements and provisions of said Standard Specifications shall apply except where modified by the plans and these Special Provisions.

SECTION 1: SCOPE OF WORK

Work Scope: The base bid includes but is not limited to the removal and replacement of walkway, landscaping, planters, pavers, sidewalk, electrical, lighting, speakers, irrigation, installation of 11 shade structures, and installation of video board pylon. The location of the work is within the City limits of the City of Sparks, Washoe County, Nevada, and is more specifically designated in the plans for this project.

SECTION 2: SPECIAL PROVISIONS

The requirements set forth in these "Special Provisions" shall be used in addition to those set forth in "Standard Specifications for Public Works Construction".

SECTION 3: PREBID CONFERENCE

A Non-Mandatory Pre-Bid conference will be held on-site at 1040 Victorian Ave in Sparks, NV 89431 on Wednesday, November 2, 2022 at 10:00 A.M.

SECTION 4: NOTICE TO PROCEED AND TIME SCHEDULE

An official "Notice to Proceed" specifying the date by which construction operations shall be started will be issued in writing and delivered to the CONTRACTOR by the City at the Pre-construction Meeting. Contract time will begin on the date specified in the "Notice to Proceed", unless operations begin at an earlier date, in which case the date that such operations begin will apply. The CONTRACTOR shall immediately begin and diligently prosecute the work to completion. The CONTRACTOR shall obligate himself to complete the work within the stated time limits. All work described in this document shall be completed in the 120 calendar day time limit.

SECTION 5: LIQUIDATED DAMAGES

In case all work called for under the contract is not completed before or upon the expiration of the time limits set forth above, it is agreed by the parties to the contract that damage will be sustained by the City and that it will be impracticable to determine accurately the actual damage the City will sustain in the event of any such delay. Therefore, the CONTRACTOR shall pay to the City:

- ONE THOUSAND DOLLARS (**\$1000.00**) for each and every calendar day delay after the **120 calendar day** completion time limit.

In finishing the work in excess of the dates prescribed and the City shall further have the right to charge to the CONTRACTOR, his heirs, assigns or sureties and to deduct from the final payment for the work, all or any part as it may deem proper of the actual cost of which are directly chargeable to the contract and which accrue during the period of such extensions, except that the cost of the final surveys and preparation of final estimate shall not be included in such charges.

The City may deduct this amount from any money due or that may become due the CONTRACTOR under the contract. This payment shall not be considered as a penalty, but as liquidated damages suffered

by the City on account of the failure of the CONTRACTOR to complete the work within the time limit of the contract.

SECTION 6: EXCUSABLE DELAYS

The CONTRACTOR shall not be assessed with liquidated damage nor the cost of the Project Manager and inspection during any delay in the completion of the work caused by acts of God, the public enemy, fire, floods, epidemics, quarantine restrictions, strikes, freight embargoes, unusually severe weather, or due to such causes, provided that the CONTRACTOR shall within ten (10) days from the beginning of such delay notify the Project Manager in writing of the causes of delay. The Project Manager's findings of the facts thereon shall be final and conclusive.

SECTION 7: INTENT OF THE PLANS AND SPECIFICATIONS

The intent of the plans and specifications is to prescribe a complete outline of work, which the CONTRACTOR undertakes to do in full compliance with the contract.

The CONTRACTOR shall furnish all required materials, equipment, tools, labor and incidentals, unless otherwise provided in the contract and shall include the cost of these items in the contract unit prices for the several units of work. All items of work called for on the plans or in the specifications and not included as a separate item in the proposal shall be considered as incidental to the other items listed in the proposal and the payment for such incidental items shall be considered as included in the contract unit prices bid.

SECTION 8: AUTHORITY OF THE PROJECT MANAGER AND INSPECTOR

All work shall be done under the supervision of the Project Manager acting on behalf of the City. The Project Manager shall decide all questions that arise as to the quality and acceptability of materials furnished, work performed, manner of performance, rates of progress, interpretation of the plans and specifications, acceptable fulfillment of the contract and compensation under the specifications. He shall determine the amount of work performed and materials furnished, and his decision and estimate shall be final. The Project Managers estimate shall be "condition precedent" to the right of the CONTRACTOR to receive money due him under the contract. The Project Manager does not have authority to authorize changes in plans and specifications without prior written approval of the Engineer.

The City shall provide an inspector who will represent the City and shall make inspections of all work, sample and test materials and do such other work relative to supervision of the project as he may be assigned by the City. All instructions given by the inspector are subject to approval by the Project Manager and the Engineer. The Contractor shall take direction only from the Project Manager and Inspector.

SECTION 9: CHANGE ORDERS

The City of Sparks reserves the right to make alterations or supplements to the Contract. Change Order Forms are required for all changes in decreases and/or increases of quantities and/or dollar amount changes in accordance with the Standard Specifications and required by the City of Sparks.

SECTION 10: COOPERATION WITH OTHER CONTRACTORS

The CONTRACTOR shall coordinate with other CONTRACTOR's who may be employed by the City or private developers on construction of other work adjacent to or in the proximity of the location of the project.

SECTION 11: DISPOSAL OF EXCESS AND WASTE MATERIALS

Trash and construction debris during construction shall become the property of the CONTRACTOR and shall be removed by the CONTRACTOR and shall be legally disposed of offsite in accordance with all federal, state and local regulations.

SECTION 12: LIMITS OF CONTRACTOR'S OPERATIONS

If the CONTRACTOR's operations result in damage to any publicly or privately owned, the CONTRACTOR shall, at his expense, repair such damage or indemnify the owner of the damaged property.

At no time will the CONTRACTOR be allowed to store debris or materials on the public streets overnight. Materials will be allowed to be stored onsite with the approval and direction of the City Project Representative.

SECTION 13: MEASUREMENT FOR PAYMENT

The total amount payable under this contract shall be determined by the percentage of the work performed and determined from prices as furnished by the CONTRACTOR in the schedule of prices contained in his proposal. The percentage of work performed shall be determined by the Project Manager. Monthly billing shall be broken out to reflect each bid item as provided in this bid.

SECTION 14: PRECONSTRUCTION CONFERENCE

After the execution of the contract, but prior to the commencement of any work, a preconstruction conference between the CONTRACTOR and the city will be held at a mutually acceptable time and place.

SECTION 15: WORKING DAYS, WORK HOURS, SATURDAY, SUNDAY, HOLIDAY AND OVERTIME WORK

The CONTRACTOR's normal working hours shall be from 7:00 A.M. until 7:00 P.M., Monday through Friday unless otherwise required by these specifications or approved in writing by the City Project Manager when requested in writing by the CONTRACTOR. The CONTRACTOR shall not commence Construction operations before seven o'clock (7:00 A.M. Pacific Time) each working day except as directed by the City Project Manager and as specified herein.

The CONTRACTOR shall not perform any contract work on Saturday, Sunday, legal Holidays and outside of the twelve (12) hours available during a regular working day except as directed and/or approved by the city Project Manager and as specified herein.

If the CONTRACTOR plans to perform work outside of the twelve (12) hours available during a regular working day, the CONTRACTOR shall first obtain approval from the City Project Manager at least twenty-four (24) hours prior to commencing such overtime work. If the CONTRACTOR plans to perform work on Saturday or Sunday, he/she shall obtain approval by the Thursday prior to work on the Saturday or Sunday for which work is planned. If the CONTRACTOR plans to perform work on a legal Holiday, he/she shall first obtain approval from the City Project Manager at least 48 hours in advance.

The CONTRACTOR shall be charged for all of City of Sparks' employee(s) time spent for overtime, Saturday, Sunday or Holiday work, based on the employee's hourly rate, plus benefits. The CONTRACTOR will be notified of the costs incurred and if the payment is not made, such costs will be deducted from any payment due to the CONTRACTOR.

The City of Spark recognizes the following legal Holidays:

January 1	New Year's Day
3 rd Monday in January	Martin Luther King, Jr. Birthday
3 rd Monday in February	President's Day
Last Monday in May	Memorial Day
June 19	Juneteenth
July 4	Independence Day
1 st Monday in September	Labor Day
Last Friday in October	Nevada Day
November 11	Veteran's Day
4 th Thursday in November	Thanksgiving Day
4 th Friday in November	Family Day (day after Thanksgiving)
December 25	Christmas Day

SECTION 16: SUBMITTALS

Submittals for the following items shall be provided at the time of the preconstruction meeting. Submittals shall be submitted by electronic pdf.

- Construction Schedule and a plan for completing the project, in its' entirety, in 120 days. **SEE SECTION 20 FOR MORE DETAILS ON SCHEDULING.**
- Items for submittal are detailed in each section of the Specifications. See Section 20.
- When street lanes need to be closed or traffic modified a traffic control plan shall be submitted to the project manager for approval a minimum of 2 days prior to placing traffic control.

SECTION 17: CLEANUP AND DUST CONTROL

At completion of the workday, the Contractor shall clean up all waste material, excess materials, and trash.

SECTION 18: FORCE ACCOUNT

Force Account items as defined by the City of Sparks will be additions to the contract arising within the course and scope of the contract for incidental costs due to unforeseen circumstances.

Any force account items shall be adjusted daily upon report sheets, furnished to the Project Manager by the CONTRACTOR and signed by both parties. These daily reports shall thereafter be considered the true record of force account items for unforeseen circumstances. No additional incidental work shall be performed or made except upon a written order from the Project Manager.

SECTION 19: INSURANCE AND INDEMNIFICATION

The CONTRACTOR shall not commence any work nor permit a Subcontractor to commence work on this project until satisfactory proof has been presented to the City of Sparks Purchasing Division that all insurance requirements as outlined by the City have been met.

The CONTRACTOR shall provide and maintain, during the effective life of the awarded contract, Comprehensive General Liability Insurance covering the CONTRACTOR and the City of Sparks.

SECTION 20: CONSTRUCTION SCHEDULE

A construction schedule will be required and approved by the project manager prior to starting construction to minimize disruption to Nugget Events Center and City of Sparks Events, and to provide a plan for completing the project by the **120 calendar day, time limit**. To accommodate residents/surrounding businesses and minimize disruption within the neighborhood. Construction

submittals shall be approved, and items ordered as soon as possible to minimize delays in construction due to lead times that could impact the schedule.

BID ITEM CLARIFICATIONS
NUGGET EVENTS CENTER FORECOURT
BID # 22/23-009 / PWP #WA-2023-077

GENERAL INFORMATION

All construction shall conform to the Standard Specifications for Public Works Construction for Northern Nevada (Orange Book) and Standard Details for Public Works Construction latest edition, unless otherwise noted on the plans or herein.

The Engineer's estimated quantity, as contained in the bid schedule, is based on the details and dimensions shown on the plans and no guarantee is made that the quantity, which can be determined by computations, will equal the estimated quantity. No allowance will be made in the event that the quantity based on the computations does not equal the estimated quantity.

In case of discrepancy between the quantity contained in the bid schedule and the quantity or summation of quantities for the same item shown on the plans, payment will be based on the quantity contained in the bid schedule.

If the quantity of a particular item of work is intentionally increased or decreased by the project owner during construction, the final payment of that item will be adjusted to reflect the change.

For bid items which are based on field measurement, the owner representative and the contractor shall agree upon the quantity on a daily basis.

The contractor shall be responsible for attaining all required permitting for the project.

BID ITEM D1 THROUGH D9

Bid items D1 through D9 shall be completed as outlined in the bid item schedule, along with any other miscellaneous associated work activities necessary to complete the project as stated in the plans, specifications and bid documents, including all labor, equipment, materials, and all necessary incidentals. Each item payment shall be as noted in the bid item schedule.

The final pay quantity shall be measured as indicated in the bid schedule. Payment for each item shall be made at the applicable unit price bid, which shall be deemed full compensation to complete the work as specified.

BID ITEM C1 THROUGH C7

Bid items C1 through C7 shall be completed as outlined in the bid item schedule, along with any other miscellaneous associated work activities necessary to complete the project as stated in the plans, specifications and bid documents, including all labor, equipment, materials, and all necessary incidentals. Each item payment shall be as noted in the bid item schedule.

The final pay quantity shall be measured as indicated in the bid schedule. Payment for each item shall be made at the applicable unit price bid, which shall be deemed full compensation to complete the work as specified.

BID ITEM E1 THROUGH E25

Bid items E1 through E25 shall be completed as outlined in the bid item schedule, along with any other miscellaneous associated work activities necessary to complete the project as

stated in the plans, specifications and bid documents, including all labor, equipment, materials, and all necessary incidentals. Each item payment shall be as noted in the bid item schedule.

The final pay quantity shall be measured as indicated in the bid schedule. Payment for each item shall be made at the applicable unit price bid, which shall be deemed full compensation to complete the work as specified.

BID ITEM A1 THROUGH A9

Bid items A1 through A9 shall be completed as outlined in the bid item schedule, along with any other miscellaneous associated work activities necessary to complete the project as stated in the plans, specifications and bid documents, including all labor, equipment, materials, and all necessary incidentals. Each item payment shall be as noted in the bid item schedule.

The final pay quantity shall be measured as indicated in the bid schedule. Payment for each item shall be made at the applicable unit price bid, which shall be deemed full compensation to complete the work as specified.

BID ITEM L1 THROUGH L20

Bid items L1 through L20 shall be completed as outlined in the bid item schedule, along with any other miscellaneous associated work activities necessary to complete the project as stated in the plans, specifications and bid documents, including all labor, equipment, materials, and all necessary incidentals. Each item payment shall be as noted in the bid item schedule.

The final pay quantity shall be measured as indicated in the bid schedule. Payment for each item shall be made at the applicable unit price bid, which shall be deemed full compensation to complete the work as specified.

BID ITEM G1 THROUGH G5

Bid items G1 through G5 shall be completed as outlined in the bid item schedule, along with any other miscellaneous associated work activities necessary to complete the project as stated in the plans, specifications and bid documents, including all labor, equipment, materials, and all necessary incidentals. Each item payment shall be as noted in the bid item schedule.

The final pay quantity shall be measured as indicated in the bid schedule. Payment for each item shall be made at the applicable unit price bid, which shall be deemed full compensation to complete the work as specified.

BID ITEM G6 – FORCE ACCOUNT

A force account has been established for this project and shall be included in each bid. The force account will be utilized only as necessary for extra work authorized and approved in advance by the City of Sparks representative as per Special Provision Section 18.

Nugget Events Center Forecourt

Sparks, Nevada

LANDSCAPE ARCHITECTURE 100% CONSTRUCTION DOCUMENTS

Specifications

September 21st, 2022

Owner

City of Sparks, NV

431 Prater Way
Sparks, NV 89431
Tel: (719) 385-5940

Landscape Architect

Design Workshop

1390 Lawrence St., Suite 100
Denver, CO 80204
Tel: (303) 623-5186

<u>Section</u>	<u>Title</u>	<u>Issue Date</u>
DIVISION 01 – GENERAL REQUIREMENTS		
	Temporary Erosion and Sedimentation Control (see plans)	9/21/2022
TECHNICAL SPECIFICATIONS		
DIVISION 02 – EXISTING CONDITIONS		
024119	Selective Demolition	9/21/2022
DIVISION 03 – CONCRETE		
031000	Concrete Forming and Accessories	9/21/2022
033000	Cast-in-Place Concrete (Civil / Landscape)	9/21/2022
033000.1	Cast-in-Place Concrete (Structural)	9/21/2022
032000	Concrete Reinforcing	9/21/2022
034500	Precast Architectural Concrete	9/21/2022
034900	Glass-Fiber-Reinforced Concrete (GFRC)	9/21/2022
DIVISION 05-METALS		
050519	Post-Installed Concrete Anchors	9/21/2022
051200	Structural Steel Framing	9/21/2022
051213	Architecturally Exposed Steel Framing	9/21/2022
DIVISION 06-WOOD, PLASTICS, AND COMPOSITS		
061000	Rough Carpentry	9/21/2022
061053	Miscellaneous Rough Carpentry	9/21/2022
061600	Sheathing	9/21/2022
DIVISION 07-THERMAL AND MOISTURE PROTECTION		
072100	Thermal Insulation	9/21/2022
072726	Fluid-Applied Membrane	9/21/2022
074213.13	Formed Metal Wall Panels	9/21/2022
075419	Polyvinyl-Chloride (PVC)	9/21/2022
076200	Sheet Metal Flashing and Trim	9/21/2022
079200	Joint Sealants	9/21/2022
DIVISION 10 – SPECIALTIES		
101400	Signage	9/21/2022
DIVISION 26 & 27 – ELECTRICAL & COMMUNICATIONS		
260001	Electrical General Provisions	9/21/2022
260002	Electrical Submittals	9/21/2022
260503	Equipment Wiring Connections	9/21/2022
260519	Low-Voltage Electrical Power Conductors and Cables	9/21/2022
260526	Grounding and Bonding for Electrical Systems	9/21/2022
TABLE OF CONTENTS		

260529	Hangers, Supports and Fire Stopping for Electrical Systems	9/21/2022
260530	Seismic Protection for Electrical Equipment	9/21/2022
260533	Raceway and Boxes for Electrical Systems	9/21/2022
260533	Electrical Identification	9/21/2022
262716	Electrical Cabinets and Enclosures	9/21/2022
262726	Wiring Devices	9/21/2022
265600	Exterior Lighting	9/21/2022
270543	Exterior Communication Pathways	9/21/2022
274100	Audio Systems	9/21/2022

DIVISION 31 – EARTHWORK

311000	Site Clearing	9/21/2022
312000	Earth Moving	9/21/2022
321123	Aggregate Base Courses	9/21/2022

DIVISION 32 – EXTERIOR IMPROVEMENTS

321316	Decorative Concrete Paving	9/21/2022
321373	Concrete Paving Joint Sealants	9/21/2022
321400	Unit Paving	9/21/2022
321540	Stone Mulch	9/21/2022
321726	Tactile Warning Surfacing	9/21/2022
321813	Synthetic Grass Surfacing	9/21/2022
328400	Landscape Irrigation	9/21/2022
329300	Soil Preparation	9/21/2022
329200	Plants	9/21/2022

DIVISION 33 – UTILITIES

334100	Storm Utility Drainage Piping	9/21/2022
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PROFESSIONAL SEALS (1 of 2)

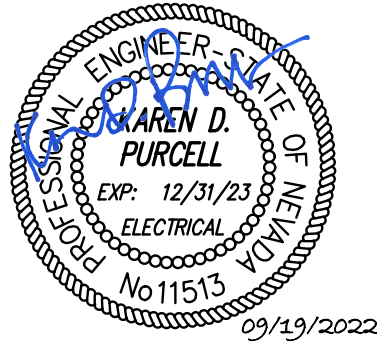
Landscape Architect

1390 Lawrence Street
Suite 100
Denver, Colorado 80204
Tel: (303) 623-5186



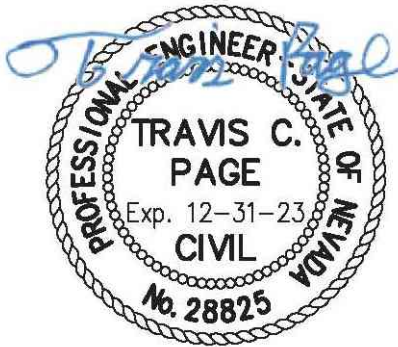
Electrical

PK Electrical
681 Sierra Rose Dr suite b,
Reno, NV 89511
(775) 826-9010



Civil Engineer

Odyssey Engineering
895 Roberta Lane,
Suite 104
Sparks, Nevada 89431
Tel: (775) 359-3303



Irrigation Design

Hines Irrigation Consultants
323 West Drake Road
Suite 204
Fort Collins, CO 80526
Tel: (970) 282-1800



PROFESSIONAL SEALS (2 of 2)

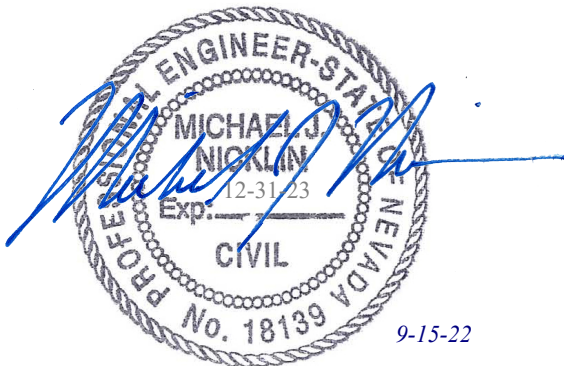
Architect

Genlser Architecture
1225 17th Street
Suite 150
Denver, CO 80202
Tel: +1 (303) 595-8585



Structural

Linchpin Structural Engineering, Inc.
10031 West River Street
Truckee, CA 96161
Tel: 530.563.6341



SECTION 260001 - ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Drawings and General provisions of the Contract including the "General Conditions", "Supplementary Conditions", and "General Requirements" of the Contract as written and referred to here are adopted and made part of Division 26.
- B. The Contract Agreement, Bidding documents, and all Addenda issued prior to Contract Agreement execution form a part of these specifications and apply to all Contracts or Subcontracts relating to the electrical systems.

1.2 SUMMARY

- A. The work under this Division shall consist of all labor, materials, equipment, services and related accessories, etc., necessary and required to complete all work as shown or inferred on the Drawings and in the Specifications (Contract Documents).
- B. Provide fixed electrical equipment, except where specifically noted otherwise.
- C. Provide portable electrical equipment for the complete system(s).
- D. Provide equipment and/or wiring normally furnished or required for complete electrical systems but not specifically specified on the drawings and/or in specifications, as though specified by both.
- E. All equipment and wiring shall be new, except where specifically shown or specified otherwise.
- F. Provide flexible electrical conduit and conductors having a slack, 90-degree bend or loop in any plane between connections at all vibration isolated equipment and the first attachment to building structure or cabinets, panels or boxes mounted thereon.

1.3 WORK INCLUDED IN THIS DIVISION

- A. Electrical work includes, but is not limited to
 - 1. Arranging and coordinating with local utility companies for services required as shown or specified.
 - 2. Removal or relocation of electrical services and electrical work located on or crossing through project property, above or below grade, obstructing construction of project or conflicting with completed project or any applicable code.
 - 3. Provide meters, switchboards, panelboards, circuit breakers, power outlets, convenience outlets, switches, and/or other equipment forming part of system.
 - 4. Connection of all appliances and equipment including Owner furnished equipment.

5. Complete grounding system.
6. Complete temporary facilities for construction power.
7. Integrated Electronic Communications Network.
8. Complete fire alarm system.
9. Complete door security system.
10. Complete door alarm system.
11. Complete empty raceway system(s) for auxiliary system(s) as shown.

1.4 WORK NOT INCLUDED IN THIS DIVISION (REFER TO OTHER DIVISIONS OF THESE SPECIFICATIONS)

- A. Flashing of conduits into roofs and outside walls. Inform General Contractor of number and size of roof penetrations prior to bidding.
- B. Furring of building structure or finishes for conduit and equipment.
- C. Finish painting of conduit and equipment except for factory applied prime or finish painting specified for equipment, fixtures, devices or materials furnished under this section.
- D. Installation of motors except where specifically noted. See Divisions 23 and 25.
- E. Control wiring for mechanical systems, except where specifically indicated to be provided by Electrical Contractor. See Divisions 23 and 25.

1.5 RELATED WORK SPECIFIED ELSEWHERE

- A. Classification of Excavation: Division 2 – Site work.
- B. Concrete Work: Division 3.
- C. Painting: Division 9.
- D. Firestopping: Division 7.

1.6 REFERENCES

NEC:	National Electrical Code (latest edition adopted by local authorities unless otherwise noted).
NFPA:	National Fire Protection Association.
OSHA:	Occupational Safety and Health Administration.
UL:	Underwriters Laboratories, Inc.
NEMA:	National Electrical Manufacturer’s Association.
IEEE:	Institute of Electrical and Electronic Engineers.
ACI:	American Concrete Institute.
ADA:	American Disabilities Act.
ANSI:	American National Standards Institutes.
ASTM:	American Society for Testing Materials.

AWS:	American Welding Society.
FM:	Factory Mutual Insurance Association.
IBC:	International Building Code
IES:	Illumination Engineering Society.
ISA:	Instrument Society of America.
LPI	Lightning Protection Institute.
NACE:	National Association of Corrosion Engineers.
NETA:	International Electrical Testing Association.
UL:	Underwriters Laboratories.
NECA:	National Electrical Contractors Association
NETA:	National Electrical Testing Association.

1.7 ADOPTED CODES

- A. 2012 International Building Code (IBC) Published by the International Code Council (ICC).
- B. 2011 National Electrical Code (NEC) published by the National Fire Protection Association (NFPA)
- C. 2012 International Fire Code (IFC) published by the International Code Council.
- D. National Fire Codes (NFPA Standards) published by the National Fire Protection Association (NFPA) as referenced in the 2012 International Fire Code.
- E. 2012 International Energy Conservation Code (IECC) published by the International Code Council. ASHRAE/IESNA Standard 90.1-2004 is incorporated by reference.
- F. All applicable provisions of the Nevada Revised Statutes (NRS) and the Nevada Administrative Code (NAC), including those listed below.
- G. The most current regulations of the State Fire Marshal, Nevada Department of Public Safety, Carson City, Nevada (NAC Chapter 477, State Fire Marshal).
- H. The most current edition of the Americans with Disabilities Act (ADA) published by the United States Department of Justice including the Americans with Disabilities Act Accessibility Guidelines (ADAAG)
- I. Other codes, regulations, and standards referenced in the body of this document.
- J. Local codes and ordinances do not apply to projects constructed on state-owned land, except for zoning requirements pursuant to Nevada Revised Statutes Section 278.580.

1.8 DEFINITIONS

Provide:	Furnish, install, connect and test until complete.
Wire:	Furnish all necessary wiring, connect and test until complete.
Install:	Furnish, set in place, wire and test until complete.

Work:	Materials completely installed, connected, and tested until complete.
AWG:	American Wire Gage.
Equal:	Acceptable equal as determined by the Engineer.

1.9 REQUIREMENTS OF REGULATORY AGENCIES

- A. Obtain and pay for all permits and inspections required for the work. Comply with all ordinances pertaining to work described herein. Pay all expenses arising from the procurement of these certificates and include in the base Contract Price.
- B. Install work under this Division per drawings, specifications, latest adopted edition of the National Electrical Code, (NFPA-70) including local amendments and interpretations, Local adopted Building Codes, and any special codes having jurisdiction over specific portions of work within complete installation. In event of conflict, install work per most stringent code requirements determined by Engineer. This does not relieve the Contractor from furnishing and installing work shown or specified which may exceed the requirements of such ordinances, laws, regulations and codes.
- C. All materials, products, devices, fixtures, forms or types of construction included in this project shall meet or exceed the published requirements of National Electrical Code (NEC), American National Standards Institute (ANSI), Institute of Electrical and Electronics Engineers (IEEE) and National Electrical Manufacturers Associations (NEMA). All equipment shall bear the Underwriter's Laboratories (UL) label or equivalent from approved independent testing laboratory.
- D. Arrange, pay fees for and complete work to pass required tests by agencies having authority over work. Deliver to Engineer copies of the Certificates of Inspection and approval issued by authorities and provide original copy of each certificate to Owner.
- E. When required by law or regulations, the governmental agency having jurisdiction for inspections shall be given reasonable notice and opportunity to inspect the work. Any work that is enclosed or covered up before such inspection and test shall be uncovered at the Contractor's expense; after it has been inspected, the Contractor shall restore the work to its original condition at his own expense.

1.10 INSURANCE

- A. The Contractor shall procure and maintain, at his expense, such insurance as required by law and/or specified in the General Conditions.

1.11 DRAWINGS AND SPECIFICATIONS

- A. Drawings and specifications are complementary. Work called for by one is binding as if called for by both. Any discrepancies between drawings and specifications shall be brought to the attention of the Engineer for clarification during the bidding period. No allowance shall subsequently be made to the Contractor by reason of his failure to have brought said discrepancies to the attention of the Consultant during the bidding period or by reason of any error on the Contractor's part.
- B. Drawings are schematic and diagrammatic in nature. Drawings show general run of circuits and approximate location of equipment. The contractor shall review drawings of all trades to assure coordination prior to placement of work. Right is reserved to change location of equipment and devices, and routing of conduits within 10 feet, without extra cost to Owner (prior to rough-in).

- C. Use dimensions in figures, shop drawings, etc. and actual site measurements in preference to scaled dimensions. Do not scale drawings for exact sizes or locations – use dimensioned details or actual field conditions. Verify item mounting heights as required by project conditions prior to rough-in.
- D. The architectural drawings shall take precedence over all other drawings in matters of dimensions. Discrepancies between different drawings or between drawings and specifications, or regulations and codes governing the installation shall be brought to the attention of the Engineer in writing for determination.
- E. Layout equipment as shown on drawings as close as possible. Verify access requirements for equipment actually furnished, and adjust layout to comply with NEC 110. Right is reserved to change layout within 10 feet without additional cost (prior to rough-in).
- F. All devices, light fixtures, etc. located in ceiling tiles shall be located in the center of the ceiling tile UNLESS specifically noted or approved to do otherwise.
- G. The Contractor is responsible to field measure and confirm the mounting heights and location of electrical equipment with respect to counters, doorways, and other architectural, mechanical or structural work. Do not scale distances off the electrical drawings: Use actual building dimensions.
- H. Execution of Contract is evidence that Contractor has examined all existing conditions, drawings and specifications related to work, and is informed to extent and character of work. Later claims for labor and materials required due to difficulties encountered, which could have been foreseen had examination been made, will not be recognized.
- I. All work called for in this Section of the plans and specifications shall be performed under this Section, regardless of whether such work may also have been called for in other Section(s). Discrepancies in or conflicts among the various parts of the contract drawings shall not relieve Contractor of his obligation to perform.
- J. No attempt has been made to establish the required sections or splits of equipment relative to the size of access into the space, building, etc. Contractor shall establish all said splits, sections, etc. necessary to install equipment complete without undue disassembly of equipment or demolition of building parts at site of work.
- K. Charges for extra work are not allowed unless work is authorized by written order from the Owner's Representative approving charges for work.
- L. Check all door swings so light switches are not located behind doors. Relocate switches as required with the Engineer's review.
- M. Elevators: The location of switches, GFCI receptacles, lights, telephone outlets, disconnect switches, fire alarm devices, etc., in elevator pits, shafts, equipment rooms shall be located as required by the Elevator Shop Drawings and applicable codes. Coordinate size and type of all electrical devices with Elevator Contractor prior to purchase of equipment.

1.12 SEISMIC QUALIFICATIONS & REQUIREMENTS

- A. Equipment Seismic Qualification
Major equipment and components shall be suitable for and certified to meet all applicable seismic requirements of the International Building Code (IBC) through zone 4 application. Guidelines for the installation consistent with these requirements shall be provided by the manufacturer and be based upon testing of representative equipment. The test response spectrum shall be based upon a 5% minimum damping factor, CBC: a peak of 2.15g's and a ZPA of 0.86g's applied at the base of the equipment. The tests shall fully envelop this response spectrum for all equipment natural frequencies up to at least 35 Hz.
- B. Structural Design Requirements
1. Include in the bid, hiring of a structural engineer, registered in the state of Nevada, to provide calculations and details for equipment pads and mounting and bracing of all major equipment. Attach equipment according to those calculations.
 2. Major equipment and components include:
 - a) Conduit racks and supports.
 - b) Transformers.
 - c) Panelboards.
 - d) Service and Distribution switchboards.
 3. Equipment anchoring and bracing shall be designed to conform to IBC 2012 and NRS 341.143.
- C. See Spec Section 26 05 30 Seismic Protection for Electrical Equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All material shall be new, and have a UL label where available. If UL label is not available, material shall be manufactured in accordance with applicable NEMA, IEEE and Federal Standards. Use UL labeled components in assemblies that do not have overall UL label. All equipment shall comply with the terms "listed and labeled" as defined in the NEC 70, Article 100. Submit letter stating compliance with these requirements.
- B. Utilize one of the manufacturers listed to furnish all of the major equipment (i.e., transformers, bus duct, switchgear, circuit breakers, etc.) required for this project.
- C. In all cases, there is one basis of design manufacturer or product for each item of equipment or product shown on the drawings and/or specified herein. These products are identified by name and model number on the drawings and/or in the specifications. Alternative manufacturers and products are also listed; however their inclusion as an alternative manufacturer or product does not cause them to be the basis of design. If an alternative manufacturer and/or product is desired to be used by the Contractor, it will be considered a substitution. Substitutions will be interpreted to be all manufacturers or products other than the basis of design. Only one request for substitution will be considered for each item of material or equipment. No substitutions will be considered thereafter. After a substitution request is reviewed and is found to be unacceptable the Architect/Engineer reserves the right to require the originally specified equipment or product at no additional cost to the Owner.

- D. In any case where the Contractor intends to utilize a listed or unlisted acceptable equipment manufacturer that is not the basis of design as listed on the drawings and in the specifications, it is the Contractor's responsibility to confirm prior to bidding that all ductwork, piping, controls, electrical power, conduit, service clearances, space requirements, and structural requirements match those of the basis of design equipment. Costs for any revisions necessary to accommodate the ductwork, piping, controls, electrical power, conduit, service clearances, space requirements, and structural requirements for the alternative equipment are the responsibility of the Contractor and shall be included in the Contractor's bid, this includes any costs associated with re-design or necessary calculations by the project Architect or Engineers. No extra cost will be allowed for failure to allow for accommodations related to the alternative equipment in the Contractor's bid.
- E. Submit to the Architect/Engineer for review, within a reasonable time after award of Contract and in ample time to avoid delay of construction, shop drawings or submittals on all items of equipment and materials, including all substitutions. Also see Division 1 for additional related requirements.
- F. If the Contractor desires to make a substitution, he shall submit complete information or catalog data to show equality of equipment or material offered to that specified. No substitutions will be allowed unless requested and reviewed in writing. The Architect/Engineer will review and take appropriate action on shop drawings, product data, samples, and other submittals as required by the contract documents. Such review shall be only for general conformance with the design concept and general compliance with the information given in the contract documents. The review shall not include review of quantities, dimensions, weights or gauges, fabrication processes, construction methods, coordination with the work of other trades, or construction safety precautions, all of which are the sole responsibility of the Contractor. Review of a specific item shall not indicate acceptance of an assembly of which the item is a component. The Architect/Engineer shall not be required to review and shall not be responsible for any deviations from the Contract Documents not clearly noted by the Contractor, nor shall the Architect/Engineer be required to review partial submissions or those for which submissions for correlated items have not been received. The Architect/Engineer reserves the right to require the originally specified item at no additional cost to the Owner.
- G. Installation of reviewed substitutions is the Contractor's responsibility. Any changes required for installation of reviewed substituted equipment must be made without additional cost to the Owner. Review by the Architect/Engineer of the substituted equipment and/or the dimensioned drawings does not waive the requirements stated herein.
- H.

PART 3 - EXECUTION

3.1 VISIT TO SITE

- A. Visit site, and survey existing conditions affecting work prior to bid. Include necessary materials and labor to accomplish the electrical work, including relocation of existing services and utilities on building site in bid. No consideration shall be given to future claims due to existing conditions. Any discrepancies or interferences shall be reported immediately to the Engineer.

3.2 WORKMANSHIP

- A. All work performed shall be first class work in every aspect. The work shall be performed by mechanics skilled in their respective trades, who shall at all times be under the supervision of competent persons. All work shall be installed to comply with NECA's "Standard of Installation."
- B. Work under this Division shall be first class with emphasis on neatness and workmanship. All work shall be installed square and plumb and concealed where possible. Work that is deficient, defective, poorly laid out, not perfectly aligned, or that is not consistent with the requirements generally accepted in the trade for "first class work" will not be acceptable.
- C. In addition to the materials specified elsewhere, furnish and install all other miscellaneous items necessary for the completion of the work to the extent that all systems are complete and operative.
- D. All work under this Section shall be performed in cooperation with the work performed under all other Sections of the Specifications for the Project in order to avoid interference with other work and to secure the proper installation of all work. Refer the Drawings and Specifications covering the work to be performed under all Sections, so that the relation and extent of the work of this Section with respect to the work of all other Sections is understood. Give right of way to raceways and piping systems installed at a required slope.
- E. Install work using competent mechanics, under supervision of foreman, all duly certified by local authorities. The installation shall be subject to the Engineer's observation, and final acceptance. The Engineer may reject unsuitable work.
- F. Conduit systems must be complete prior to installation of wiring.

3.3 CHANGE ORDERS

- A. Additional work may be required on the project which is outside the scope of the contract. Such additional work will be described in Supplemental Instructions and/or Clarifications, to be estimated and priced by the Contractor, and accepted by the Owner, prior to commencing work. Proposals shall include a list of quantities of all material being used with unit costs broken down into material and labor costs per unit.
- B. Material costs and labor units shall not exceed the latest edition of RS Means Electrical Cost Data.
- C. See the General Conditions of the Specifications for acceptable charges.

3.4 GUARANTEE

- A. Furnish the Owner a written guarantee, stating that if workmanship and/or material executed under this Division is proven defective within one (1) year after final acceptance by the Owner, such defects and other work damaged will be repaired and/or replaced. Submit with Operations and Maintenance Manuals.
- B. Obtain from the various manufacturers or vendors guarantees or warranties for their particular equipment or components, and deliver them to the Owner. All guarantees and warranties provided shall be referenced to this project.

- C. In event that systems are placed in operation in several phases at the Owner's request, guarantee will begin on date each system or item of equipment is accepted for service by the Owner. Provide O&M manuals for all equipment when equipment is accepted for service by the Owner.
- D. All guarantees and warranties shall include labor and material at the site of installation for the duration of the guarantee period.

3.5 OBSERVATIONS OF WORK AND DEMONSTRATION OF OPERATION (ACCEPTANCE)

- A. At all observations of work, open panel covers, junction box covers, pull box covers, device covers, and other equipment with removable plates for observation. Provide sufficient personnel to expedite cover removal and replacement.
- B. Contractor to demonstrate operation of new equipment and/or systems to satisfaction of Owner/Engineer. Contractor to have manufacturer available for demonstration of equipment and/or systems where requested by Owner/Engineer. Furnish affidavit signed by Owner's representative indicating that demonstration of operation has been performed.

3.6 COOPERATION AND COORDINATION

- A. Carefully coordinate work with other contractors and subcontractors. Refer conflicts between trades to Engineer. Provide necessary information to other trades for such coordination. Such information shall include Shop Drawings, Product Data and all other required data.
- B. Provide a system erection/coordination drawing showing electrical, HVAC, plumbing and architectural for installation in congested areas. Drawings shall be in plan view for work above the ceilings and also sections shall be provided showing the elevations of conduit racks and routing and the coordination with mechanical piping and ductwork.
- C. Whenever such information is not provided in a timely manner or whenever such information is incorrect, this contractor shall bear all costs for providing or correcting affected work of related trades with no change to the Contract Price or Construction Schedule.
- D. Work to be installed as progress of project will allow. Schedule of work determined by General Contractor, Owner, and/or Architect/Engineer.

3.7 HVAC CONTROL WIRING

- A. Control Wiring including low voltage and line voltage interlock wiring will be furnished and installed under Divisions 23 and 25, except where specifically shown otherwise. Carefully coordinate power and control wiring interface.
- B. This Contractor shall obtain from Divisions 23 and 25 all wiring diagrams associated with the HVAC work and furnish all power and 120V control wiring, disconnects and starters for equipment not already packaged with these items. The Contractor shall include in his bid connections, disconnects and circuiting for all added and relocated equipment as directed by the Temperature Controls Contractor even if it is not shown on the bid documents. All wiring and conduit associated with the HVAC Temperature Control System is included under Division 23 and 25. Wiring and conduit shall comply with Division 26. All electrical work associated with the HVAC system shall be done under the supervision of Division 23 and 25.

3.8 STARTERS

- A. Separately mounted starters are furnished and installed under Division 26 unless specifically shown otherwise. All power wiring, fuses, thermal overloads, and disconnect switches and connection of all motors is under this division. Provide the proper feeders and connections as recommended by the manufacturer of the equipment.

3.9 PROTECTING

- A. Provide warning lights, bracing, shoring, rails, guards and covers necessary to prevent damage or injury. All persons working around electrical equipment shall have electrical shock and flash protection per OSHA 1910.301-309 & 331-335.
- B. Do not leave exposed or unprotected, electrical items carrying current. Protect visitors and workers from exposure to contact with electrically energized surfaces, parts, etc. in accordance with OSHA standards.

3.10 DELIVERY, STORAGE AND HANDLING

- A. Deliver equipment and materials to job site in original, unopened, labeled container. Products shall be properly identified with names, model numbers, types, grades, compliance labels and other information needed for identification. Store to prevent damage and injury. Store materials to prevent corroding. Store finished materials and equipment to prevent staining and discoloring. Store materials affected by condensation in warm dry areas. Provide heaters. Contractor shall verify the availability of on site storage space, if no on site storage space is available then the contractor shall cover the cost for off site storage. Materials stored at the project site that becomes soiled with construction dirt, concrete, or moisture shall be removed from the site and replaced with new. Do not install soiled material.
- B. Protect work and materials from damage by weather, entrance of water or dirt. Cap and mark conduit during installation.
- C. Avoid damage to materials and equipment in place. Repair, or remove and replace damaged work and materials.
- D. Protection and safekeeping of products stored on premises is responsibility of Contractor supplying products.
- E. Schedule of deliveries and unloading to prevent traffic congestion blocking of access or interference with work. Arrange deliveries to avoid larger accumulations of materials than can be suitably stored at site.
- F. Install equipment per manufacturer's recommendations. Conflicts between contract documents and these recommendations shall be referred to Engineer for remedy.
- G. Electrical or electronic equipment that has been damaged, exposed to weather or is, in the opinion of the Engineer or Architect, otherwise unsuitable because of improper fabrication, storage or installation shall be removed and replaced by this Contractor at his expense.

3.11 ANCHORS

- A. Provide anchors for all equipment, raceways, hangers, etc. to safely support weight of item involved plus 100% for dead loads. Live loads shall be considered in addition to dead loads.

- B. Anchors to consist of expansion type devices similar to "Redhead" or lead expansion anchors. Plastic anchors are not acceptable.
- C. Use preset anchor steel inserts in concrete slabs. Provide preset anchor size and type for anticipated or specified rod/bolt size and live/dead load.

3.12 CLEANING AND PAINTING

- A. Clean equipment furnished in this Division after completion of work. Clean wipe the interior of all conduit, pullboxes, junction boxes, outlet boxes, and panelboard backboxes, soiled with dirt and debris prior to installation of wiring.
- B. Touch-up or re-paint damaged painted finishes as determined by the Engineer.
- C. Remove debris, packing cartons, scrap, etc., from site daily.

3.13 SPARE PARTS

- A. Where spare parts are specified in the Technical Sections, furnish spare parts to Owner with itemized receipt. Contractor is responsible to deliver parts and have receipt signed by Owner's representative. Turn over receipt with as-built documents.

3.14 HOUSEKEEPING PADS

- A. Furnish 2500 # concrete pads, 4" high (interior locations) or 6" high (exterior locations) unless otherwise noted, for all freestanding equipment, i.e.: switchboards, panels, control panels, motor control centers, transformers, etc. Pads shall have 1" x 45° chamfered edges, and shall extend 2" to 4" beyond equipment mountings. Refer also to structural.

3.15 TRAINING

- A. Training for operation and maintenance of new systems or modifications to existing systems is specified in Technical sections. Contractor shall submit with record documents an itemized receipt signed by Owner's representative that all specified training has been received.

3.16 ACCESS PANELS

- A. The contractor shall furnish all access panels for walls, partitions, etc., and shall give access panel to the General Contractor for installation at locations as directed by the Electrical Contractor. It shall be the responsibility of the Electrical Contractor that access panels are provided for access to all boxes, bus joints, equipment, etc., which may be concealed by building construction to comply with the NEC and NFPA. Access panels shall be installed so as not to interfere with lighting arrangements.

END OF SECTION 260001

SECTION 260002 - ELECTRICAL SUBMITTALS

PART 1 - GENERAL

1.1 DESCRIPTION OF SUBMITTAL CATEGORIES

- A. The required submittals are defined below and specified in each section.
1. Requests for substitutions are written requests to use materials, equipment, etc., different from that specified.
 2. Shop Drawings include fabrication, layout, wiring diagrams, erection, setting, coordination, drawings and diagrams and performance data.
 3. Samples are units of work, materials or equipment items, showing the workmanship, pattern, trim and similar qualities proposed.
 4. Manufacturer's Data is standard printed product information concerning the standard portions of the manufacturer's products.
 5. Certifications are written statements, executed specifically for the project application by an authorized officer of the contracting firm, manufacturer, or other firm as designated, certifying to compliance with the specified requirements.
 6. Test Reports are specific reports prepared by independent testing laboratories, showing the results of specified testing.
 7. Industry Standards are printed copies of the current standards in the industry.
 8. Manufacturer's Product Warranties are manufacturer's standard printed commitment in reference to a specific product and normal application, stating that certain acts of restitution will be performed by the manufacturer if the product fails under certain conditions and times limits.
 9. Operating Instructions are the written instructions by the manufacturer, fabricator or installer of equipment or systems, detailing the procedures to be followed by the Owner's in operation, control and shut-down.
 10. Maintenance Manuals are the compiled information provided for the Owner's maintenance of each system of operating equipment.
 11. Maintenance Materials (spare parts) are extra stock of parts or materials for the Owner's initial use in maintaining the equipment and systems in operation.
 12. Record Drawings are accurate representations of the installed systems and wiring as recorded on a daily "as-installed" basis.
 13. Guarantees are signed commitments to the Owner that certain acts of restitution will be performed if certain portions of work fail within certain conditions and time limits.
 14. Product Data includes manufacturer's data pertaining to the products, materials and equipment of the work.
 15. Method of Procedures are detailed sequences of work required during interruption of service and/or connection to energized parts of systems requiring special sequences or protections.
 16. Training – Materials and sign-off of completion.
 17. Identification nomenclature – See section 26 05 53.

PART 2 - PRODUCTS

2.1 PROPOSED MATERIAL MANUFACTURERS

- A. Submit to Consultant within 30 days after award of contract a complete list of proposed material manufacturers. List does not preclude submission of shop drawings. Acceptance of manufacturer on list does not constitute acceptance of specific material or equipment. If shop drawings are submitted with non-approved substitutions, the contractor will pay the expense incurred by the consultant to review the shop drawings of any re-submittal.

PART 3 – EXECUTION

3.1 SUBSTITUTIONS

- A. In addition to the following see General Conditions of the specifications for information regarding substitutions. Specified catalog numbers are used for description of equipment and standard of quality only. Equivalent material will be given consideration only if adequate comparison data including samples are provided. Alternate products shall meet or exceed design criteria.
 - 1. Substitution product shall be clearly indicated as such including the product(s) they are intended to substitute.
 - 2. Should substitutions be found otherwise acceptable they shall not result in any redesign effort to the design team.

3.2 SUBMITTAL FORM AND PROCEDURES

- B. Shop and Erection Drawings
 - 1. Submit shop drawings for material and equipment furnished under Division 26 of specifications, to Consultant for review within 30 days after award of contract. Shop drawings shall be submitted on timely basis to allow adequate lead time for review, re-submission if necessary, manufacture and delivery to allow access of material to project at correct time based on schedule established by Consultant/Contractor. Provide index with thumb tabs collated with Table of Contents for sections. Include complete descriptive data with dimensions, operating data and weight for each item of equipment. Carefully examine shop drawings to assure compliance with drawings and specifications prior to submittal to Consultant. **Shop drawings and submittals shall bear the stamp of approval of the Electrical Contractor as evidence that they have checked the drawings.** Drawing submitted without this stamp of approval will not be considered and will be returned for proper re-submission. All shop drawings shall be submitted as a single one time complete package. Partial packages shall not be reviewed.
 - 2. Coordinate required number of submittals with general conditions. Electronic submittals shall be produced in PDF format.
 - 3. Clearly mark each shop drawing item to correspond to drawings and specifications. Any drawings not clearly marked will be rejected.
 - 4. Review of shop drawings does not relieve Contractor of responsibility for errors and omissions in shop drawings. Contractor is responsible for dimensions and sizes of equipment. Inform Engineer in writing of equipment differing from that specified.
- C. "Record" Drawings

1. One complete set of prints will be furnished by the Contractor to indicate actual location of conduit systems, outlets, and equipment. Keep set of prints on job and record day to day changes to Contract drawings with red pencil. Provide "Record" red line prints at the completion of job. Turn over prints to Architect/Engineer at final inspection.

D. Maintenance Materials

1. Submit a list of all warranties and guarantees.
2. Submit with final close out documents a signed receipt for all maintenance materials (spare parts) specified. See Technical Sections for required materials.

E. Product Warranties and Guarantees

1. Submit fully executed Product Warranties and Contractor Guarantees to the Owner with final close out documents.

F. Maintenance Manuals

1. Submit to Consultant three (3) sets of data prepared by manufacturer for each item and/or device of electrical equipment furnished in this contract completely describing and identifying equipment. Data to include serial numbers, catalog/model numbers, parts lists, description of operation, final shop drawings, wiring diagrams, all electrical ratings, set-up and maintenance procedures and other literature required for maintenance of equipment. See Technical Sections for other required information.

G. Summary of Project Closeout Items for Owner

1. Certificates of inspection and approval from authorities having jurisdiction.
2. Executed Guarantees and Product Warranties.
3. "Record" drawings.
4. Final shop drawings.
5. Final Erection drawings.
6. Receipt for maintenance materials (spare parts).
7. Maintenance manuals.
8. Receipt for keys.
9. Completed test reports.
10. Signed off observation and punch lists.
11. Lien waivers.

3.3 SPECIFIC SUBMITTAL REQUIREMENTS

A. Shop Drawings shall include, but not be limited to the following:

1. Shall be drawn to accurate scale except where diagrammatic representations are specifically indicated.
2. Shall show clearance dimensions of critical locations and show dimensions of spaces required for operation and maintenance of equipment.
3. Shall show conduit and conductor connections and other service connections.
4. Shall show interfaces with other work including structural support.
5. Shall include complete descriptive data, with dimensions, operating data and weight.
6. Shall indicate deviation from the contract documents.

7. Shall explain deviations.
 8. Shall show short circuit current ratings for all electrical equipment.
 9. Shall show how deviations coordinate with portions of the work, currently or previously submitted.
- B. Review of shop drawings shall not relieve Contractor of responsibility for errors or omissions in shop drawings. Any equipment that will not fit into space shown on drawings shall be called to the attention of the Engineer in writing.
- C. Samples: Submit samples where requested by Engineer. Engineer's review of sample submittals
1. Shall be limited to general type, pattern and finish.
 2. Shall not include testing and inspection of the submitted samples.
 3. Shall not indicate complete compliance with specified requirements. Complete compliance with specifications is the exclusive responsibility of the Contractor.
- D. Manufacturer's Data
1. Where pre-printed data covers more than one distinct item, mark copy to clearly indicate which item is to be provided.
 2. Contractor shall delete portions of data not applicable.
 3. Contractor shall mark data showing portion of operating range required for project application.
 4. Elaboration of standard data describing a non-standard product shall be processed as a shop drawing.
 5. For each product Contractor shall include the following information summarized into a single sheet document for each product
 - a) Manufacturer's production specifications including catalog/model number.
 - b) Manufacturer's Serial Number.
 - c) Installation or fabrication instructions.
 - d) Source of supply.
 - e) Sizes, weights, speeds and operating capacities.
 - f) All electrical ratings, including temperature rating of terminals.
 - g) Conduit and wire connection sizes and locations.
 - h) All thermal ratings.
 - i) Statements of compliance with required standard and governing regulations.
 - j) Cooling requirements and makeup and/or ventilating air requirements.
 - k) Performance data, where applicable.
 - l) All sound ratings.
 - m) Other information needed to confirm compliance.
 - n) Manufacturers recommended parts list.
 - o) Other information required by Technical Sections.
- E. Source Codes: Provide Source Code in both electronic and paper format and Source Code Licenses for all equipment that is computer driven. Provide Development licenses so Source Code can be examined, modified, and maintained. These Development Licenses, along with all software licenses shall become property of the Owner. At the discretion of the owner, third parties will be allowed to use the software as necessary, for the life of the work in this project. No encryption or other obfuscation will be allowed.
- F. Certifications: Contractor shall submit with notarized execution.

- G. Test Reports: Submit notarized test reports signed and dated by firm performing test.
- H. Manufacturer's Product Warranties: Contractor shall submit product warranties in accordance with the technical sections. Where published warranty includes deviation from required warranty, product is disqualified from use on project, unless manufacturer issues a specific project warranty.
- I. Operating Instructions required
 - 1. Submit manufacturer's operating instructions for each item of electrical equipment.
 - 2. Submit supplement with additional project application instructions where necessary.
 - 3. Submit specific operating instructions for each electrical system that involves multiple items of equipment.
 - 4. Submit instructions for charging, start-up, control or sequencing of operation, phase or seasonal variations, shut-down, safety and similar operations.
 - 5. All operating instructions shall be typewritten in completely explained and easily understood English language.
- J. Maintenance Manual Requirements
 - 1. Provide emergency instructions including addresses and telephone numbers for service sources.
 - 2. Provide regular system maintenance procedures.
 - 3. Indicate proper use of tools and accessories.
 - 4. Provide wiring and control diagram for each system.
 - 5. Provide manufacturer's data for each operational item in each system.
 - 6. Provide manufacturer's product warranties, and guarantee relating to the system and equipment items in the system.
 - 7. Provide Final Shop and Erection drawings relating to the system.
 - 8. Bind each operating and maintenance manual in one or more vinyl-covered, 2" 3-ring binders, plus pocket-folders for folded drawings. Index with thumb tab collated with Table of Contents for sections. Mark the back spine and front cover of each binder with system identification and volume number.
- K. Maintenance Materials: Deliver all materials to the Owner in fully identified containers or packages suitable for storage. Obtain receipt for all delivered materials signed by the Owner's Representative.
- L. Guarantees: Where indicated as "Certified", provide guarantee which, in addition to execution by an authorized officer of each guarantor, is attested to by the Secretary of each guarantor and bears the corporate seal. Submit draft of each guarantee prior to execution.

END OF SECTION 260002

SECTION 260503 - EQUIPMENT WIRING CONNECTIONS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes electrical connections to equipment.
- B. Related Sections:
 - 1. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
 - 2. Section 26 05 33 - Raceway and Boxes for Electrical Systems.

1.2 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA WD 1 - General Requirements for Wiring Devices.
 - 2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.3 SUBMITTALS

- A. General Conditions: Submittal procedures.
- B. Product Data: Submit wiring device manufacturer's catalog information showing dimensions, configurations, and construction.
- C. Manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

- A. General Conditions: Submittal procedures.
- B. Project Record Documents: Record actual locations, sizes, and configurations of equipment connections.

1.5 COORDINATION

- A. General Conditions: Coordination and project conditions.
- B. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
- C. Determine connection locations and requirements.
- D. Sequence rough-in of electrical connections to coordinate with installation of equipment.
- E. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 - PRODUCTS

2.1 CORD AND PLUGS

- A. Attachment Plug Construction: Conform to NEMA WD 1.
- B. Configuration: NEMA WD 6; match receptacle configuration at outlet furnished for equipment.
- C. Cord Construction: Type SO multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
- D. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General Conditions: Coordination and project conditions.
- B. Verify equipment is ready for electrical connection, for wiring, and to be energized.

3.2 EXISTING WORK

- A. Remove exposed abandoned equipment wiring connections, including abandoned connections above accessible ceiling finishes.
- B. Disconnect abandoned utilization equipment and remove wiring connections. Remove abandoned components when connected raceway is abandoned and removed. Install blank cover for abandoned boxes and enclosures not removed.
- C. Extend existing equipment connections using materials and methods as specified.

3.3 INSTALLATION

- A. Make electrical connections.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Install receptacle outlet to accommodate connection with attachment plug.
- E. Install cord and cap for field-supplied attachment plug.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

3.4 ADJUSTING

- A. General Conditions: Testing, adjusting, and balancing.
- B. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

END OF SECTION 260503

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes building wire and cable; nonmetallic-sheathed cable; direct burial cable; service entrance cable; armored cable; metal clad cable; and wiring connectors and connections.
- B. Related Sections:
 - 1. Section 26 05 53 - Identification for Electrical Systems: Product requirements for wire identification..

1.2 REFERENCES

- A. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- B. National Fire Protection Association:
 - 1. NFPA 70 – National Electrical Code.
 - 2. NFPA 262 – Standard Method of Test for Flame Travel and Smoke of Wires and Cables for use in Air-Handling Spaces.

1.3 SYSTEM DESCRIPTION

- A. Product Requirements: Provide products as follows:
 - 1. Solid conductor for feeders and branch circuits 10 AWG and smaller.
 - 2. Stranded conductors for control circuits.
 - 3. Conductor not smaller than 12 AWG for power and lighting circuits.
 - 4. Conductor not smaller than 16 AWG for control circuits.
 - 5. Increase branch conductor size, including ground wire proportionally, to maintain maximum of 5% voltage drop between the feeder and branch wiring device.
 - 6. 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet and less than 200 feet.
 - 7. 8 AWG conductors for 20 ampere, 120 volt branch circuits longer than 125 feet.
 - 8. 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet (60 m) and less than 350 feet.
 - 9. 8 AWG conductors for 20 ampere, 277 volt branch circuits longer than 350 feet.
- B. Wiring Methods: Provide the following wiring methods:
 - 1. All Concealed Locations: Use only building wire, Type THHN/THWN insulation, in raceway.

1.4 DESIGN REQUIREMENTS

- A. Conductor sizes are based on copper. All conductors should be copper.

1.5 SUBMITTALS

- A. General Conditions: Requirements for submittals.

- B. Product Data: Submit for building wire.
- C. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors.
- D. Test Reports: Indicate procedures and values obtained.

1.6 CLOSEOUT SUBMITTALS

- A. General Conditions: Requirements for submittals.
- B. Project Record Documents: Record actual locations of components and circuits.

1.7 QUALITY ASSURANCE

- A. Provide Wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with NFPA 262.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on Drawings.

1.10 COORDINATION

- A. General Conditions: Requirements for coordination.
- B. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

- A. Product Description: Single conductor insulated wire.
- B. Conductor: Copper.
- C. Insulation: NFPA 70; Type THHN/THWN insulation for feeder and branch circuits.

2.2 METAL CLAD CABLE (TYPE MC) – NOT ALLOWED.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General Conditions: Coordination and project conditions.
- B. Verify interior of building has been protected from weather.
- C. Verify mechanical work likely to damage wire and cable has been completed.
- D. Verify raceway installation is complete and supported.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 EXISTING WORK

- A. Remove exposed abandoned wire and cable, including abandoned wire and cable above accessible ceiling finishes. Patch surfaces where removed cables pass through building finishes.
- B. Disconnect abandoned circuits and remove circuit wire and cable. Remove abandoned boxes when wire and cable servicing boxes is abandoned and removed. Install blank cover for abandoned boxes not removed.
- C. Provide access to existing wiring connections remaining active and requiring access. Modify installation or install access panel.
- D. Extend existing circuits using materials and methods as specified.
- E. Clean and repair existing wire and cable remaining or wire and cable to be reinstalled.

3.4 INSTALLATION

- A. Route wire and cable to meet Project conditions.
- B. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- C. Identify and color code wire and cable under provisions of Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.
- D. Special Techniques--Building Wire in Raceway:
 - 1. Pull conductors into raceway at same time.
 - 2. Install building wire 4 AWG and larger with pulling equipment.
- E. Special Techniques - Cable:
 - 1. Protect exposed cable from damage.

2. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure. Do not rest cable on ceiling panels.
 3. Use suitable cable fittings and connectors.
- F. Special Techniques - Wiring Connections:
1. Clean conductor surfaces before installing lugs and connectors.
 2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
 3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
 4. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.
 5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
 6. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
 7. When splicing wires in a junction box, the wires must be twisted in a minimum of three (3) turns before placing the wire nut on the splicer to maintain mechanical continuity if the wire nut needs to be removed.
 8. Install suitable reducing connectors or mechanical connector adaptors for connecting aluminum conductors to copper conductors.
- G. Install solid conductor for feeders and branch circuits 10 AWG and smaller.
- H. Install stranded conductors for branch circuits 10 AWG and smaller. However, when stranded conductors are used in lieu of solid, then install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.

3.5 WIRE COLOR

- A. General
1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
 - a. Black and red for single phase circuits at 120/240 volts.
 - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
 - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
 2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
 - a. Black and red for single phase circuits at 120/240 volts.
 - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
 - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
- B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.
- C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.
- D. Feeder Circuit Conductors: Uniquely color code each phase.
- E. Ground Conductors:
1. For 6 AWG and smaller: Green.

2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

3.6 FIELD QUALITY CONTROL

- A. General Conditions: Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rod electrodes.
2. Active electrodes.
3. Wire.
4. Grounding well components.
5. Mechanical connectors.
6. Exothermic connections.

B. Related Sections:

1. Section 03 20 00 - Concrete Reinforcing: Bonding or welding bars when reinforcing steel is used for electrodes.
2. Section 33 79 00 - Site Grounding: Site related grounding components for buildings and facilities.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers:

1. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
2. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.

B. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

C. National Fire Protection Association:

1. NFPA 70 - National Electrical Code.

1.3 SYSTEM DESCRIPTION

A. Grounding systems use the following elements as grounding electrodes:

1. Metal underground water pipe.
2. Metal building frame.
3. Concrete-encased electrode.
4. Metal underground gas piping system.
5. Rod electrode.
6. Plate electrode.

1.4 DESIGN REQUIREMENTS

- A. Construct and test grounding systems for access flooring systems on conductive floors accordance with IEEE 1100.

1.5 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: 5 ohms maximum.

1.6 SUBMITTALS

- A. General Conditions: Requirements for submittals.
- B. Product Data: Submit data on grounding electrodes and connections.
- C. Test Reports: Indicate overall resistance to ground [and resistance of each electrode].
- D. Manufacturer's Installation Instructions: Submit for active electrodes.
- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.7 CLOSEOUT SUBMITTALS

- A. General Conditions: Requirements for submittals.
- B. Project Record Documents: Record actual locations of components and grounding electrodes.

1.8 QUALITY ASSURANCE

- A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.
- B. Perform Work in accordance with all applicable codes and standards.
- C. Maintain one copy of each document on site.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum 3 years documented experience approved by manufacturer.

1.10 PRE-INSTALLATION MEETINGS

- A. General Conditions: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. General Conditions: Requirements for transporting, handling, storing, and protecting products.

- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.
- D. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

1.12 COORDINATION

- A. General Conditions: Requirements for coordination.
- B. Complete grounding and bonding of building reinforcing steel prior concrete placement.

PART 2 - PRODUCTS

2.1 ROD ELECTRODES

- A. Product Description:
 - 1. Material: Copper.
 - 2. Diameter: 3/4 inch (19 mm).
 - 3. Length: 10 feet (3.0 m).
- B. Connector: Connector for exothermic welded connection.

2.2 WIRE

- A. Material: Stranded copper.
- B. Foundation Electrodes: As indicated on drawings.
- C. Grounding Electrode Conductor: Copper conductor bare.
- D. Bonding Conductor: Copper conductor bare.

2.3 MECHANICAL CONNECTORS

- A. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.

2.4 EXOTHERMIC CONNECTIONS

- A. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General Conditions: Verification of existing conditions before starting work.
- B. Verify final backfill and compaction has been completed before driving rod electrodes.

3.2 PREPARATION

- A. Remove paint, rust, mill oils, surface contaminants at connection points.

3.3 EXISTING WORK

- A. Modify existing grounding system to maintain continuity to accommodate renovations.

3.4 INSTALLATION

- A. Install in accordance with IEEE 142.
- B. Install rod electrodes at locations as indicated on Drawings. Install additional rod electrodes to achieve specified resistance to ground.
- C. Install grounding and bonding conductors concealed from view.
- D. Install grounding well pipe with cover at each rod location. Install well pipe top flush with finished grade.
- E. Install grounding electrode conductor and connect to reinforcing steel in foundation footing as indicated on Drawings. Electrically bond steel together.
- F. Bond together metal siding not attached to grounded structure; bond to ground.
- G. Install ground grid under access floors as indicated on Drawings. Construct grid of 4 AWG bare copper wire installed on 24 inch centers both ways. Bond each access floor pedestal to grid.
- H. Bond together each metallic raceway, pipe, duct and other metal object entering space under access floors. Bond to underfloor ground grid. Install 2 AWG bare copper bonding conductor.
- I. Install isolated grounding conductor for circuits supplying indicated in accordance with IEEE 1100.
- J. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- K. Connect to site grounding system. Refer to Section 33 79 00.
- L. Install continuous grounding using underground cold water system and building steel as grounding electrode. Where water piping is not available, install artificial station ground by means of driven rods or buried electrodes.

- M. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting panelboards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.
- N. Install branch circuits feeding isolated ground receptacles with separate insulated grounding conductor, connected only at isolated ground receptacle, ground terminals, and at ground bus of serving panel.
- O. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.
- P. Grounding electrical system using continuous metal raceway system enclosing circuit conductors in accordance with NEC.
- Q. Permanently attach equipment and grounding conductors prior to energizing equipment.

3.5 FIELD QUALITY CONTROL

- A. General Conditions: Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.
- D. Perform ground resistance testing in accordance with IEEE 142.
- E. Perform continuity testing in accordance with IEEE 142.
- F. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

END OF SECTION 260526

SECTION 260529 – HANGERS, SUPPORTS AND FIRE STOPPING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Conduit supports.
2. Formed steel channel.
3. Spring steel clips.
4. Sleeves.
5. Mechanical sleeve seals.
6. Firestopping relating to electrical work.
7. Firestopping accessories.
8. Equipment bases and supports.

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete: Product requirements for concrete for placement by this section.

1.2 REFERENCES

A. ASTM International:

1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
4. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.

B. FM Global:

1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.

C. National Fire Protection Association:

1. NFPA 70 - National Electrical Code.

D. Underwriters Laboratories Inc.:

1. UL 263 - Fire Tests of Building Construction and Materials.
2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
3. UL 1479 - Fire Tests of Through-Penetration Firestops.
4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
5. UL - Fire Resistance Directory.
- 6.

E. Intertek Testing Services (Warnock Hersey Listed):

1. WH - Certification Listings.

1.3 DEFINITIONS

- A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.4 SYSTEM DESCRIPTION

- A. Firestopping Materials: ASTM E119, ASTM E814, UL 263, UL 1479, to achieve fire ratings of adjacent construction. In accordance with Design Numbers.
- B. Surface Burning: UL 723 with maximum flame spread / smoke developed rating of 25/450.
- C. Firestop interruptions to fire rated assemblies, materials, and components.

1.5 PERFORMANCE REQUIREMENTS

- A. Firestopping: Conform to UL for fire resistance ratings and surface burning characteristics.

1.6 SUBMITTALS

- A. General Conditions: Requirements for submittals.
- B. Shop Drawings: Indicate system layout with location and detail of trapeze hangers.
- C. Product Data:
 - 1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
 - 2. Firestopping: Submit data on product characteristics, performance and limitation criteria.
- D. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.
- E. Design Data: Indicate load carrying capacity of trapeze hangers and hangers and supports.
- F. Manufacturer's Installation Instructions:
 - 1. Hangers and Supports: Submit special procedures and assembly of components.
 - 2. Firestopping: Submit preparation and installation instructions.
- G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- H. Engineering Judgements: For conditions not covered by UL or WH listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.7 QUALITY ASSURANCE

- A. Through Penetration Firestopping of Fire Rated Assemblies: UL 1479 or ASTM E814 with 0.10 inch water gage (24.9 Pa) minimum positive pressure differential to achieve fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
 - 1. Wall Penetrations: Fire F-Ratings as indicated on Drawings, but not less than 1-hour.

2. Floor and Roof Penetrations: Fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
 - a. Floor Penetrations Within Wall Cavities: T-Rating is not required.
- B. Through Penetration Firestopping of Non-Fire Rated Floor and Roof Assemblies: Materials to resist free passage of flame and products of combustion.
 1. Noncombustible Penetrating Items: Noncombustible materials for penetrating items connecting maximum of three stories.
 2. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.
- C. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: [ASTM E1966 or] UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.
- D. Fire Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10 inch water gage (24.9 Pa) minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.
- E. Surface Burning Characteristics: 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience approved by manufacturer.

1.9 PRE-INSTALLATION MEETINGS

- A. General Conditions: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. General Conditions: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

1.11 ENVIRONMENTAL REQUIREMENTS

- A. General Conditions: Environmental conditions affecting products on site.

- B. Do not apply firestopping materials when temperature of substrate material and ambient air is below 60 degrees F (15 degrees C).
- C. Maintain this minimum temperature before, during, and for minimum 3 days after installation of firestopping materials.
- D. Provide ventilation in areas to receive solvent cured materials.

PART 2 - PRODUCTS

2.1 CONDUIT SUPPORTS

- A. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.
- B. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.
- C. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.
- D. Conduit clamps - general purpose: One hole malleable iron for surface mounted conduits.
- E. Cable Ties: High strength nylon temperature rated to 185 degrees F (85 degrees C). Self locking.

2.2 FORMED STEEL CHANNEL

- A. Product Description: Galvanized 12 gage (2.8 mm) thick steel. With holes 1-1/2 inches (38 mm) on center.

2.3 SPRING STEEL CLIPS

- A. Product Description: Mounting hole and screw closure.

2.4 SLEEVES

- A. Furnish materials in accordance with State of Nevada Public Work's standards.
- B. Sleeves Through Non-fire Rated Floors: 18 gage (1.2 mm) thick galvanized steel.
- C. Sleeves for Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 mm thick galvanized steel.
- D. Sleeves for Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.
- E. Fire-stopping Insulation: Glass fiber type, non-combustible.

2.5 MECHANICAL SLEEVE SEALS

- A. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.6 FIRESTOPPING

- A. Manufacturers:
1. Dow Corning Corp.
 2. 3M fire Protection Products.
 3. Specified Technology, Inc.
 4. Substitutions: General Conditions
- B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
1. Silicone Firestopping Elastomeric Firestopping: Single component silicone elastomeric compound and compatible silicone sealant.
 2. Foam Firestopping Compounds: Single component foam compound.
 3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
 4. Fiber Stuffing and Sealant Firestopping: Composite of mineral fiber stuffing insulation with silicone elastomer for smoke stopping.
 5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
 6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
 7. Firestop Pillows: Formed mineral fiber pillows.
- C. Color: Dark gray.

2.7 FIRESTOPPING ACCESSORIES

- A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.
- B. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.
- C. General:
1. Furnish UL listed products.
 2. Select products with rating not less than rating of wall or floor being penetrated.
- D. Non-Rated Surfaces:
1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where conduit is exposed.

2. For exterior wall openings below grade, furnish modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill annular space between conduit and cored opening or water-stop type wall sleeve.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General Conditions: Verification of existing conditions before starting work.
- B. Verify openings are ready to receive sleeves.
- C. Verify openings are ready to receive firestopping.

3.2 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.
- B. Remove incompatible materials affecting bond.
- C. Obtain permission from Architect/Engineer before using powder-actuated anchors.
- D. Do not drill or cut structural members.

3.3 INSTALLATION - HANGERS AND SUPPORTS

- A. Anchors and Fasteners:
 1. Concrete Structural Elements: Provide precast inserts, expansion anchors, and preset inserts.
 2. Steel Structural Elements: Provide beam clamps, spring steel clips, steel ramset fasteners, and welded fasteners.
 3. Concrete Surfaces: Provide self-drilling anchors and expansion anchors.
 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Provide toggle bolts and hollow wall fasteners.
 5. Solid Masonry Walls: Provide expansion anchors and preset inserts.
 6. Sheet Metal: Provide sheet metal screws.
 7. Wood Elements: Provide wood screws.
- B. Inserts:
 1. Install inserts for placement in concrete forms.
 2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches (100 mm).
 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut flush with top of slab.

- C. Install conduit and raceway support and spacing in accordance with NEC.
- D. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
- E. Install multiple conduit runs on common hangers.
- F. Supports:
 - 1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
 - 2. Install surface mounted cabinets and panelboards with minimum of four anchors.
 - 3. In wet and damp locations install steel channel supports to stand cabinets and panelboards 1 inch (25 mm) off wall.
 - 4. Support vertical conduit at every floor.

3.4 INSTALLATION - FIRESTOPPING

- A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.
- B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.
- C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating, to uniform density and texture.
- D. Place foamed material in layers to ensure homogenous density, filling cavities and spaces. Place sealant to completely seal junctions with adjacent dissimilar materials.
- E. Fire Rated Surface:
 - 1. Seal opening at floor, wall, partition, ceiling, and roof as follows:
 - a. Install sleeve through opening and extending beyond minimum of 1 inch (25 mm) on both sides of building element.
 - b. Size sleeve allowing minimum of 1 inch (25 mm) void between sleeve and building element.
 - c. Pack void with backing material.
 - d. Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.
 - 2. Where cable tray, conduit, wireway, and cable penetrates fire rated surface, install firestopping product in accordance with manufacturer's instructions.
- F. Non-Rated Surfaces:
 - 1. Seal opening through non-fire rated wall, partition, floor, ceiling and roof opening as follows:
 - a. Install sleeve through opening and extending beyond minimum of 1 inch (25 mm) on both sides of building element.
 - b. Size sleeve allowing minimum of 1 inch (25 mm) void between sleeve and building element.
 - c. Install type of firestopping material recommended by manufacturer.

2. Install floor plates or ceiling plates where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
3. Exterior wall openings below grade: Assemble rubber links of mechanical seal to size of conduit and tighten in place, in accordance with manufacturer's instructions.
4. Interior partitions: Seal pipe penetrations at computer rooms and data rooms. Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

- A. Furnish 2500 # concrete pads, 4" high (interior locations) or 6" high (exterior locations) unless otherwise noted, for all freestanding equipment, i.e.: switchboards, panels, control panels, motor control centers, transformers, etc. Pads shall have 1" x 45-degree chamfered edges and shall extend 2" to 4" beyond equipment mountings. Refer to Section 03 30 00.
- B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct supports of steel members. Brace and fasten with flanges bolted to structure.

3.6 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Seal with adjustable interlocking rubber links.
- B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.
- C. Set sleeves in position in forms. Provide reinforcing around sleeves.
- D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- E. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- F. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with fire stopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- G. Install chrome plated steel escutcheons at finished surfaces.

3.7 FIELD QUALITY CONTROL

- A. General Conditions: Field inspecting, testing, adjusting, and balancing.
- B. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.8 CLEANING

- A. General Conditions: Requirements for cleaning.
- B. Clean adjacent surfaces of firestopping materials.

3.9 PROTECTION OF FINISHED WORK

- A. General Conditions: Requirements for protecting finished Work.
- B. Protect adjacent surfaces from damage by material installation.

END OF SECTION 260529

SECTION 260530 – SEISMIC PROTECTION FOR ELECTRICAL EQUIPMENT

PART 1 – GENERAL

1.1 SUMMARY

- A. Structural design and calculations for major equipment anchoring, conduit support, and bracing details.

1.2 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.3 REFERENCES

- A. International Building Code, 2018
- B. UL 1570 – Fluorescent Lighting Fixtures
- C. UL 1571 – Incandescent Lighting Fixtures
- D. UL 1572 – HID Lighting Fixtures
- E. UL1573 – Stage Lighting Units
- F. UL1574 – Track Lighting Systems

1.4 CODE INFORMATION

- A. This project is subject to the seismic bracing requirements of the International Building Code, 2018 edition. The following criteria are applicable to this project.
 - 1. Risk Category: III
 - 2. Site Class Category: D
 - 3. Seismic Design Category: D
 - 4. See Structural Sheets for Code Analysis and additional information.
- B. It is recommended that the contractor enlist the services of a qualified seismic bracing vendor/supplier. Provide bracing for identified equipment and system.

- C. Resistance to lateral forces induced by earthquakes shall be accomplished with consideration of friction resulting from gravity loads. The following companies are listed as resources for the Contractor to consider for obtaining competent assistance regarding the seismic bracing of electrical systems and equipment. Since seismic constraint is not a common mechanical requirement for projects, and considering that the requirements are specific and include technical expertise, this information may be helpful.

1. Amber Booth
2. Cooper B-Line
3. Mason Industries
4. Tolco (Division of Nibco)

1.5 SUBMITTALS

- A. Shop Drawings: Detail drawings along with catalog cuts, templates, and erection and installation details, as appropriate, for the items listed. Submittals shall be complete in detail; shall indicate thickness, type, grade, class of metal, and dimensions; and shall show construction details, reinforcement, anchorage, and installation with relation to the building construction.

1. Lighting Fixtures in Buildings.
2. Equipment Requirements.

- B. Product Data:

1. Copies of the design calculations with the detail drawings. Calculations shall be stamped by a registered engineer in the State of Nevada and shall verify the capability of structural members to which bracing are attached for carrying the load from the brace. Structural seismic calculations for equipment anchorage for major equipment shall be included.
2. Contractor Designed Bracing: Copies of the Design Calculations with the Drawings. Calculations shall be approved, certified, stamped and signed by a Registered Professional Engineer. Calculations shall verify the capability of structural members to which bracing are attached for carrying the load from the brace.

- C. Include Seismic Certification for major equipment.

1. Light Fixtures.
2. Transformers.
3. Switchboards.
4. Panelboards.
5. Emergency Lighting Inverters.

1.6 QUALIFICATION

- A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five years. When requested by the engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- D. Provide Seismic qualified equipment as follows:
The equipment and major components shall be suitable for and certified by actual seismic testing to meet all applicable seismic requirements of the 2018 International Building Code (IBC) Site Classification D. Guidelines for the installation consistent with these requirements shall be provided by the equipment manufacturer and based upon testing of representative equipment. Equipment certification acceptance criteria shall be based upon the ability for the equipment to be returned to service immediately after a seismic event within the above requirements without the need for repairs.

1.7 SYSTEM DESCRIPTION

- A. The requirements for seismic protection measures described in this section shall be applied to the electrical equipment and systems listed below.
- B. Electrical Equipment: Electrical equipment shall include the following items to the extent required on the Drawings or in other sections of these specifications:
 - 1. Light Fixtures.
 - 2. Transformers.
 - 3. Switchboards.
 - 4. Panelboards.
 - 5. Emergency Lighting Inverters.
- C. Electrical Systems: The following electrical systems shall be seismically protected in accordance with this specification: Lighting, power, security, communications and fire alarm.
- D. Conduits Requiring No Special Seismic Restraints: Seismic restraints may be omitted from electrical conduit less than 2-1/2 inches trade size. All other interior conduit shall be seismically protected as specified.

1.8 EQUIPMENT REQUIREMENTS

- A. Rigidly Mounted Equipment: Constructed and assembled to withstand the seismic forces in accordance with IBC 2018. Each item of rigid electrical equipment shall be entirely located and rigidly attached on one side only of a building expansion joint. Piping, electrical conduit, etc., which cross the expansion joint shall be provided with flexible joints that are capable of accommodating displacements equal to the full width of the joint in both orthogonal directions.

PART 2 – PRODUCTS

2.1 LIGHTING FIXTURE SUPPORTS

- A. Lighting fixtures and supports shall conform to UL 1570, UL 1571, UL1572, UL1573 or UL1574 as applicable.

PART 3 – EXECUTION

3.1 SWAY BRACES FOR CONDUIT

- A. Sway bracing materials shall consist of rods, plates, angles, etc.

3.2 LIGHTING FIXTURES IN BUILDINGS

- A. Pendant Fixtures: Per manufacturer's mounting requirements and details on plans. Provide sway bracing for all pendant fixtures that will strike anything, or each other, if they sway greater than 45 degrees from nadir.
 - 1. Pendant fixtures must be able to sway 45 degrees from vertical without hitting ductwork, piping, walls, soffits, etc. Where this is not possible provide sway bracing sufficient to prevent or limit fixture movement until they do not strike anything or each other.
- B. Ceiling Attached Fixtures:
 - 1. Recessed Lighting Fixtures: Recessed individual or continuous- row mounted fixtures shall be supported by a seismic-resistant suspended ceiling support system built in accordance with the ASTM E 580. Recessed lighting fixtures not over 56 pounds in weight may be supported by and attached directly to the ceiling seismic design. Fixture accessories, including louvers, diffusers, and lenses shall have lock or screw attachments.
 - 2. Surface-Mounted Lighting Fixtures: Surface-mounted individual or continuous-row fixtures shall be attached to a seismic-restraint ceiling support system built in accordance with ASTM E 580.
- C. Assembly Mounted on Outlet Box: A supporting assembly, that is intended to be mounted on an outlet box, shall be designed to accommodate mounting features on 4-inch boxes, plaster rings, and fixture studs.
- D. Wall-Mounted Emergency Light Unit: Attachments for wall-mounted emergency light units shall be designed and secured for the worst expected seismic disturbance at the site.

3.3 ANCHOR BOLTS

- A. Cast-In-Place: Floor or pad mounted equipment shall use cast-in-place anchor bolts or Hilti HDA anchors as indicated. One nut shall be provided on each bolt. Anchor bolts shall conform to ASTM F 1554, Grade 36. Anchor bolts shall have an embedded straight length equal to at least 12 times nominal diameter of the bolt. Anchor bolts that exceed the normal depth of equipment foundation piers or pads shall either extend into concrete floor or the foundation shall be increased in depth to accommodate bolt lengths.
- B. Expansion or Chemically Bonded Anchors: Expansion or chemically bonded anchors shall not be used unless test data in accordance with ASTM E 488 has been provided verify the adequacy of the specific anchor and application. Expansion of chemically bonded anchors shall not be used to resist pull-out in overhead and wall installations.

3.4 RESILIENT VIBRATION ISOLATION DEVICES

- A. Where the need for these devices is determined, based on the magnitude of the design seismic forces, selection of anchor bolts for vibration isolation devices and/or snubbers for equipment base and foundations shall follow the same procedure as in paragraph ANCHOR BOLTS, except that an equipment weight equal to three times the actual equipment weight shall be used.

3.5 SWAY BRACES FOR CONDUIT 2-1/2" TRADESIZE AND GREATER

- A. Sway braces shall be provided to prevent movement of the conduits under seismic loading. Braces shall be provided in both the longitudinal and transverse directions, relative to the axis of the pipe. The bracing shall not interfere with thermal expansion requirements for the pipes as described in other sections of these specifications.
- B. Transverse Sway Bracing: Install transverse sway bracing for steel and conduit. All runs (length of pipe between end joints) shall have a minimum of two transverse braces.
- C. Longitudinal Sway Bracing: Longitudinal sway bracing shall be provided at 40 foot intervals unless otherwise indicated. A; runs (length of conduit between end joints) shall have one longitudinal brace minimum. Branch lines, walls, or floors shall not be used as sway braces.
- D. Vertical Runs: Run is defined as length of pipe between end joints. Vertical runs of conduit shall be braced at not more than 10-foot vertical intervals. Braces for vertical runs shall be above the center of gravity of the segment being braces. Sway braces shall not be used as sway braces.
- E. Clamps and Hangers: Clamps or hangers in conduits shall be applied directly to conduit.
- F. Anchor Rods, Angles, and Bars: Anchor rods, angles, and bars shall be bolted to either pipe clamps or pipe flanges at one end and cast-in-place concrete or masonry insert or clip angles bolted to the steel structure in the other end. Rods shall be solid metal or pipe as specified below. Anchor rods, angles, and bars shall not exceed lengths given in the tabulation below.

3.6 EQUIPMENT SWAY BRACING

- A. Suspended Equipment: Equipment sway bracing shall be provided for items supported from overhead structural systems. Braces shall consist of angles, rods, bars, or pipes and secured at both ends with not less than ½-inch bolts. Sufficient braces shall be provided for equipment to resist a horizontal force equal to three times the weight of equipment without exceeding safe working stress of bracing components. Details of equipment bracing shall be submitted for acceptance. In lieu of bracing with vertical supports, these items may be supported and braced with hangers inclined at 45 degrees directed up and radially away from equipment and oriented symmetrically in 90-degree intervals on the horizontal plane, bisecting the angles of each corner of the equipment, provided that supporting members are properly sized to support operating weight of equipment when hangers are inclined at a 45-degree angle.
- B. Floor or Pad Mounted Equipment:
1. Shear Resistance: Floor mounted equipment shall be bolted to the floor. Requirements for the number and installation of bolts to resist shear forces shall be in accordance with paragraph ANCHOR BOLTS.
 2. Overturning Resistance: The ratio of the overturning moment from seismic forces to the resisting moment due to gravity loads shall be used to determine if overturning forces need to be considered in the sizing of anchor bolts. Calculations shall be provided to verify the adequacy of the anchor bolts for combined shear and overturning.

END OF SECTION 260530

SECTION 260533 – RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.
- B. Related Sections:
 - 1. Section 26 05 03 - Equipment Wiring Connections.
 - 2. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
 - 3. Section 26 05 29 - Hangers and Supports for Electrical Systems.
 - 4. Section 26 05 53 - Identification for Electrical Systems.
 - 5. Section 26 27 16 - Electrical Cabinets and Enclosures.
 - 6. Section 26 27 26 - Wiring Devices.
 - 7. Section 27 05 43 – Exterior Communications Pathways.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
 - 2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.

1.3 SYSTEM DESCRIPTION

- A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.
- B. Underground More than 5 feet outside Foundation Wall: Provide thickwall nonmetallic conduit. Provide cast metal boxes or nonmetallic handhole.
- C. Underground Within 5 feet from Foundation Wall: Provide rigid steel plastic coated conduit. Provide cast metal or nonmetallic boxes.
- D. In or Under Slab on Grade: Under slab on grade provide PVC conduit. Minimum size ¾” conduit. Conduit not allowed to be run within slab on grade.
- E. Outdoor Locations, Above Grade: Provide rigid steel conduit and electrical metallic tubing. Provide cast metal or nonmetallic outlet, pull, and junction boxes.
- F. Wet and Damp Locations: Provide rigid steel conduit and electrical metallic tubing. Provide cast metal or nonmetallic outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.
- G. Liquid tight metal raceways when internal to structures.

- H. Concealed Dry Locations: Provide electrical metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.
- I. Exposed Dry Locations: Provide rigid steel conduit and electrical metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

1.4 DESIGN REQUIREMENTS

- A. Minimum Raceway Size: 1/2 inch unless otherwise specified.

1.5 SUBMITTALS

- A. General Conditions: Submittal procedures.
- B. Product Data: Submit for the following:
 - 1. Flexible metal conduit.
 - 2. Liquidtight flexible metal conduit.
 - 3. Nonmetallic conduit.
 - 4. Flexible nonmetallic conduit.
 - 5. Raceway fittings.
 - 6. Conduit bodies.
 - 7. Surface raceway.
 - 8. Pull and junction boxes.
 - 9. Handholes.
- C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 CLOSEOUT SUBMITTALS

- A. General Conditions: Closeout procedures.
- B. Project Record Documents:
 - 1. Record actual routing of conduits larger than 2 inch. Record actual locations and mounting heights of outlet, pull, and junction boxes.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. General Conditions: Product storage and handling requirements.
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- C. Protect PVC conduit from sunlight.

1.8 COORDINATION

- A. General Conditions: Coordination and project conditions.

- B. Coordinate installation of outlet boxes for equipment connected under Section 26 05 03.
- C. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

PART 2 - PRODUCTS

2.1 METAL CONDUIT

- A. Rigid Steel Conduit: ANSI C80.1.
- B. Intermediate Metal Conduit (IMC): Rigid steel.
- C. Fittings and Conduit Bodies: NEMA FB 1; all steel fittings.

2.2 PVC COATED METAL CONDUIT

- A. Product Description: NEMA RN 1; rigid steel conduit with external PVC coating, 40 mil thick.
- B. Fittings and Conduit Bodies: NEMA FB 1; steel fittings with external PVC coating to match conduit.

2.3 FLEXIBLE METAL CONDUIT

- A. Product Description: Interlocked steel construction.
- B. Fittings: NEMA FB 1.

2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Product Description: Interlocked steel construction with PVC jacket.
- B. Fittings: NEMA FB 1.

2.5 ELECTRICAL METALLIC TUBING (EMT)

- A. Product Description: ANSI C80.3; galvanized tubing.
- B. Fittings and Conduit Bodies: NEMA FB 1; steel, compression or set screw type.

2.6 NONMETALLIC CONDUIT

- A. Product Description: NEMA TC 2; Schedule 40 PVC.
- B. Fittings and Conduit Bodies: NEMA TC 3.

2.7 SURFACE METAL RACEWAY

- A. Product Description: Sheet metal channel with fitted cover, suitable for use as surface metal raceway.

- B. Fittings, Boxes, and Extension Rings: Furnish manufacturer's standard accessories; match finish on raceway.

2.8 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch (13 mm) male fixture studs where required.
 - 2. Concrete Ceiling Boxes: Concrete type.
- B. Cast Boxes: NEMA FB 1, Type FD, cast ferrous alloy. Furnish gasketed cover by box manufacturer.
- C. Wall Plates for Finished Areas: As specified in Section 26 27 26.
- D. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.9 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- B. Hinged Enclosures: As specified in Section 26 27 16.
- C. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:
 - 1. Material: Galvanized cast iron.
 - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
- D. In-Ground Cast Metal Box: NEMA 250, Type 6, outside flanged, recessed cover box for flush mounting:
 - 1. Material: Galvanized cast iron.
 - 2. Cover: Nonskid cover with neoprene gasket and stainless steel cover screws.
 - 3. Cover Legend: "ELECTRIC".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General Conditions: Coordination and project conditions.
- B. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.2 INSTALLATION

- A. Ground and bond raceway and boxes in accordance with Section 26 05 26.
- B. Fasten raceway and box supports to structure and finishes in accordance with Section 26 05 29.
- C. Identify raceway and boxes in accordance with Section 26 05 53.
- D. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.3 INSTALLATION - RACEWAY

- A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.
- B. Arrange raceway supports to prevent misalignment during wiring installation.
- C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- D. Group related raceway; support using conduit rack. Construct rack using steel channel specified in Section 26 05 29; provide space on each for 25 percent additional raceways.
- E. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports
- F. Do not attach raceway to ceiling support wires or other piping systems.
- G. Construct wireway supports from steel channel specified in Section 26 05 29 {16070}.
- H. Maintain clearance between raceway and piping for maintenance purposes.
- I. Maintain 12 inch (300 mm) clearance between raceway and surfaces with temperatures exceeding 104 degrees F (40 degrees C).
- J. Comply with NEC for minimum size conduit and installation requirements. Minimum size 1/2" diameter for branch circuits, minimum size 3/4" diameter for homeruns. Minimum size for PVC conduit shall be 3/4" in diameter. Conduits shall be installed complete end-to-end prior to installing conductors.
- K. Run conduit concealed where possible. Run concealed conduit above dropped or furred ceiling in an orderly manner. Multiple conduits shall be grouped and run parallel. Run all conduit tight against structure where possible. Conduit shall be run parallel or at right angles to walls, ceilings, and structural members. Do not attach conduits to ceiling suspension system channels or suspension wires. Conduit must be installed high enough above lay in ceiling to permit removal of ceiling panels and light fixtures.
- L. In concrete slab on grade or elevated slabs: Conduit may penetrate slabs but will not be allowed to run in slabs on grade or elevated slabs without expressed permission from the structural engineer.
- M. Run conduit below the roofing assembly. Conduit may not be run exposed across roof. Roof penetrations shall be per detail on plans.
- N. Exposed Conduit: Use only where specifically shown or accepted by Architect. Run perpendicular to building walls and partitions and tight against structure. Conceal vertical portion of conduits where possible.
- O. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- P. Bring conduit to shoulder of fittings; fasten securely.

- Q. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.
- R. Install conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- S. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install factory elbows for bends in metal conduit larger than 2 inch (50 mm) size.
- T. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.
- U. Install fittings to accommodate expansion and deflection where raceway crosses seismic, control and expansion joints.
- V. Install suitable pull string or cord in each empty raceway except sleeves and nipples.
- W. Install suitable caps to protect installed conduit against entrance of dirt and moisture.
- X. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.
- Y. Close ends and unused openings in wireway.
- Z. Exterior buried conduit shall be scheduled 40 PVC with PVC coated RGS 90 degree bands when penetrating through floor slabs.
- AA. FMC shall be used for final connection to lighting fixtures not to exceed 72 inches. FNC of aluminum FMC shall not be used. FMC shall not be used except as noted above without prior approval of the engineer.
- BB. Liquid-tite FMC shall be used for final connection to motors.
- CC. Provide pull wire in all empty conduits.
- DD. Coordinate routing, terminations and access of conduit internal to structures with fabricator.

3.4 INSTALLATION - BOXES

- A. Install wall mounted boxes at elevations to accommodate mounting heights as indicated on Drawings.
- B. Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.
- C. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.
- D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- E. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches (150 mm) from ceiling access panel or from removable recessed luminaire.

- F. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- G. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches (150 mm) separation. Install with minimum 24 inches (600 mm) separation in rated walls.
- H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- I. Install stamped steel bridges to fasten flush mounting outlet box between studs.
- J. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- K. Install adjustable steel channel fasteners for hung ceiling outlet box.
- L. Do not fasten boxes to ceiling support wires or other piping systems.
- M. Support boxes independently of conduit.
- N. Install gang box where more than one device is mounted together. Do not use sectional box.
- O. Install gang box with plaster ring for single device outlets.

3.5 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods specified.
- B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation specified.
- C. Locate outlet boxes to allow luminaires positioned as indicated on Drawings.
- D. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- E. Fully coordinate raceway with fabricators of structures.

3.6 ADJUSTING

- A. General Conditions: Testing, adjusting, and balancing.
- B. Adjust flush-mounting outlets to make front flush with finished wall material.
- C. Install knockout closures in unused openings in boxes.

3.7 CLEANING

- A. General Conditions: Final cleaning.
- B. Clean interior of boxes to remove dust, debris, and other material.
- C. Clean exposed surfaces and restore finish.

END OF SECTION 26 05 33

SECTION 260553 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide and install required identification for the systems and equipment shown on the drawings and/or specified. The extent of identification is specified herein and in individual technical sections of work.
- B. Coordinate with Consultant and Owner for proper equipment identification nomenclature. Nameplates must be approved by Consultant prior to ordering and installation.
- C. Types of electrical identification include:
 - 1. Conduit labeling.
 - 2. Buried cable and conduit warnings.
 - 3. Cable/conductor identification.
 - 4. Operational instructions and warnings.
 - 5. Danger signs.
 - 6. Equipment/system identification labels and signs.
 - 7. Device plate labeling.
 - 8. Junction box labeling.

1.2 RELATED WORK

- A. Painting of conduit and color coded painting of conduit if required. See Division 9.

1.3 SUBMITTALS

- A. Manufacturer's Data
 - 1. Product specifications and installation instructions for each material and device.
- B. Samples
 - 1. Provide for each color, lettering style and other graphic representation.
- C. Labels
 - 1. Provide a list of labels with actual designations as they will be printed.

PART 2 - PRODUCTS

2.1 ELECTRICAL IDENTIFICATION MATERIAL

Conform to ANSI A13.1, Table 3 for minimum size of legend letters and minimum length of color field for each raceway or cable size. Use colors prescribed by ANSI A13.7, NFPA 70 and these specifications.

- A. Color-Coded Conduit Markers

1. Manufacturer's standard preprinted, flexible or semi-rigid, permanent, plastic-sheet conduit markers, extending 360 degrees around conduits. Attach with adhesive, adhesive lap joint of marker, matching adhesive plastic tape at each end of marker, or pre-tensioned snap-on. Lettering to indicate voltage, function of conductors in conduit and shall be 8" minimum length (i.e. ac power, dc power, fire alarm).
- B. Color-Coded Plastic Tape
1. Manufacturer's standard self-adhesive vinyl tape, minimum 3 mils thick by 1-1/2" wide.
 2. Color: Orange.
- C. Underground Plastic Line Marker
1. Manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, for direct-burial service; minimum 4" wide x 4 mils thick. Printing to indicate type service of cable; with large (minimum 2-1/2") high letters.
- D. Cable/Conductor Identification Bands
1. Manufacturer's standard vinyl self-adhesive self laminating cable/conductor markers, wrap-around type; pre-numbered plastic coated, or write-on type with clear plastic self-adhesive cover flap, lettered to show circuit identification. Similar to Panduit "Instacode" or accepted equivalent by T&B, or Tyton. Refer to Section 26 05 19 Low Voltage Electrical Power Conductors and Cables.
- E. Self-Adhesive Plastic Signs
1. Manufacturer's standard, self-adhesive, pre-printed, flexible vinyl signs for operational instructions or warnings. Sizes suitable for application and visibility, with proper wording for application.
 2. Color: Orange or Yellow with black lettering.
- F. Danger Signs
1. Manufacturer's standard "DANGER" signs, baked enamel finish on 20 gage steel; standard red, black and white graphics; 14" x 10" unless 10" x 7" is largest which can be applied, or where larger size is needed for visibility use recognized explanation wording (as examples: HIGH VOLTAGE, KEEP AWAY, BURIED CABLE, DO NOT TOUCH SWITCH, DANGER-STARTS AUTOMATICALLY).
- G. Engraved Signs (Nameplates)
1. Use 1/8" thick melamine plastic laminate, complying with FS LP-387, sizes as indicated, engrave with standard letter style of sizes and wording indicated (1/4" letters minimum).
 2. Color: Black field with white letters for normal power service;
Red field, white letters for emergency/standby service;
Orange field, white letters for UPS service
 3. Fasteners: Self adhesive backing or double stick tape.
- H. Permanent Polyester Tape:

1. Use Permanent Metalized Polyester Tapes for Industrial purposes that are resistant to oil, solvents and chemicals, these durable tapes adhere to all surface.
 2. DYMO #18485, Black on Silver, 3/8" wide, or equivalent.
- I. Lettering and Graphics
1. Coordinate names, abbreviations and other designations used with those shown or specified. Provide numbers, lettering, and wording as indicated or required for identification and operation/maintenance.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION

A. General Installation Requirements

1. Install after completion of painting.
2. Comply with governing regulations and requests of governing authorities for identification of electrical work.

B. Conduit Identification

1. Use adhesive marking tape labels, Brother or Kroy labels 1" high x 12" long (min.), at 20 foot intervals to identify all conduits run exposed or located above accessible ceilings. Conduits located above non-accessible ceiling or in floors and walls shall be labeled within 3 feet of becoming accessible. Labels for multiple conduits shall be aligned. Use the following colors:
 - a. Above 600 Volts: Conduit 2" and larger - Black letters on orange background indicating feeder identification and voltage. Feeders within walls: provide identification on wall surfaces directly external to the conduits. Alternate identification labels with "DANGER - HIGH VOLTAGE" warning signs of the same color.
 - b. 600 Volt and Below Normal: Conduit 2" and larger - White letters on black background indicating feeder identification and voltage. Not required unless otherwise noted.
 - c. 600 Volt and Below Emergency: All conduit - White or black letters on red background indicating feeder identification and voltage. Not required unless otherwise noted
 - d. 600 Volt and Below UPS: All conduit - Black letters on yellow background indicating feeder identifications, circuit number and voltage. Not required unless otherwise noted
 - e. Fire Alarm: All conduit shall be manufactured red.
 - f. Temperature Control: White or black letters on blue background indicating "TEMP. CONTROL"
 - g. Ground: All conduit - White or black letters on green background
 - h. Network Fiber: All conduit - Black letters on white background indicating "NETWORK FIBER."
2. Where conduits enter or exit a panelboard, pull or junction box, switchboard, or other distribution equipment, conduit labels shall include circuit number in addition to feeder identification and voltage.

3. For overhead conduits, place identification such that it can be read standing on the floor below.
- C. Underground Cable Identification
1. During back-filling of underground cable, install continuous underground marker, directly over buried line 6" to 8" below finished grade. Where multiple lines are buried in common trench not exceeding 24" width, install a single line marker. Install additional line markers for each increment of 24" width, i.e., 36" wide trench - 2 markers; 54" wide trench, 3 markers. Install multiple markers evenly spaced.
 2. Install line marker for every buried ductbank and/or conduits 3" diameter or larger.
 3. Electric Lines: Use red colored tape with lettering stating "CAUTION BURIED ELECTRIC LINE BELOW".
 4. Communication Lines: Use orange colored tape with lettering stating "CAUTION COMMUNICATION LINE BELOW".
- D. Operational Identification and Warnings
1. Provide operational signs for:
 - a. Switchgear
 - b. Automated breakers
 - c. Transfer switches
 - d. Large motor starters
 - e. Engine-generator
 - f. All rotating equipment
 - g. Decommissioned equipment to read "Retired in Place."
- E. Danger Signs
1. Provide for medium voltage switchgear, sectionalizing loop switches, etc., as shown and described herein.
 2. Provide for engine generators and other automatic equipment, i.e.: "Danger-Starts Automatically".
 3. Provide as required by codes.
- F. Engraved Plastic Laminated Signs
1. Install on each major unit of electrical equipment in the building. Provide single line of text, 1/4" high lettering on 1" high sign (1-1/2" high where 2 lines required). Matching terminology and numbering as indicated in contract documents.
 2. Provide signs for each unit of the following categories:
 - a. Electrical cabinets and enclosures: Indicate cabinet designation, voltage, phase and feeder origin.
 - b. Access panel/doors to electrical facilities: Indicate room name and use.
 - c. Major electrical switchgear: Indicate equipment designation, voltage, phase and feeder origin.
 - d. Electrical substations: Indicate equipment designation, voltage, phase and feeder origin.
 - e. Safety switches, circuit breakers and portable engine disconnects: Indicate equipment designation, voltage, phase, feeder origin and circuit number.
 - f. Transformers: Indicate transformer designation, voltages, phases, feeder origin, circuit number and equipment served.

- g. Feeder cables inside pull and junction boxes and inside all switchgear at terminals indicating source and destination: Fasten with nylon ties.
- h. All equipment furnished in this Division of the specifications: Indicate equipment designation, voltage, phase, feeder origin and circuit number.

- G. Install signs where indicated or most visible. Secure with at least two cadmium-plated screws. Where substrate cannot receive screws, use industrial epoxy cement to secure signs. Self-adhesive or double stick tape is acceptable. Secure with cadmium plated screws on porous surfaces.

- H. Identify all conduits installed for future use.

- I. Junction, Pull and Connection boxes. Identification of systems and circuits shall indicate system voltage and identity of contained circuits on outside of box cover. Color code shall be same as conduits for pressure sensitive labels. Use self-adhesive marking tape labels at exposed locations and indelible black marker at concealed boxes. All fire alarm boxes shall have red covers. All temperature control boxes shall have blue covers.

- J. Branch Circuit Conductors shall be identified in each junction box and pull box with wire markers as manufactured by T & B, Panduit, 3M or Ideal to indicate panel/circuit number.

- K. Junction Boxes in branch circuit wiring shall be labeled with panel and circuit numbers. Junction boxes for special systems shall be labeled with system name and other identification as directed; for example, “fire alarm-zone 1”. Where boxes are installed flush mounted in finished areas or surface mounted in unfinished areas, labeling shall be with engraved plastic nameplate as specified herein. Where boxes are installed above accessible ceilings, labeling may be neat hand written lettering with indelible marker.

- L. Device Plates – switches and receptacles. Identify the panelboard and branch circuit number from which served on the front of the device plate with Permanent Polyester Clear Tape with black letters. Locate all labels at the bottom of the plate in the same location throughout.

END OF SECTION 260553

SECTION 26 09 23 – LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes and is not limited to:
 - 1. Remote control lighting relays.
 - 2. Lighting contactors.
 - 3. Switches.
 - 4. Switch plates.
 - 5. Photocells.
 - 6. Photocell control unit.

- B. Related Sections
 - 1. Section 26 05 03 - Equipment Wiring Connections: Execution requirements for electric connections specified by this section.
 - 2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
 - 3. Section 26 05 33 - Raceway and Boxes for Electrical Systems: Product requirements for raceway and boxes for placement by this section.
 - 4. Section 26 05 53 - Identification for Electrical Systems: Product requirements for electrical identification items for placement by this section.
 - 5. Section 26 27 26 - Wiring Devices: Product requirements for wiring devices for placement by this section.

1.2 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA FU 1 - Low Voltage Cartridge Fuses.
 - 2. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contractors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
 - 3. NEMA ICS 4 - Industrial Control and Systems: Terminal Blocks.
 - 4. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.
 - 5. NEMA ICS 6 - Industrial Control and Systems: Enclosures.
 - 6. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

1.3 SYSTEM DESCRIPTION

- A. Distributed switching control using self contained individually mounted lighting relays.

- B. Where indicated on drawings or required by applicable code, provide automatic shutoff for lighting by method conforming to ICC IECC.

- C. Where indicated on drawings or required by applicable code, provide automatic shutoff for all lighting. Control shutoff by method conforming to ICC IECC.

- D. Extent of lighting control system work is indicated by drawings and line diagrams and narratives and by the requirements of this section. It is the intent of this section to provide an integrated, and complete lighting control system including Lighting Control Panels, DMX controls, 0-10VDC controls, Lighting control Relays and Daylighting Controls. Contractor is responsible for confirming that the panel and sensors and controller interoperate as a single system.

1.4 SUBMITTALS

- A. General Conditions: Requirements for submittals.
- B. Shop Drawings: Indicate dimensioned drawings of lighting control system components and accessories.
 - 1. One Line Diagram: Indicating system configuration indicating panels, number and type of switches or devices.
 - 2. Include typical wiring diagrams for each component.
 - 3. Detailed point to point wiring diagrams and plans showing occupancy and photo cell controls.
 - 4. Provide typical mounting details for all equipment and devices.
 - 5. Sample calibration log.
 - 6. Provide Source Code and Source Code Licenses for all equipment that is computer driven. Provide Development licenses so Source Code can be examined. These Development Licenses, along with all software licenses shall become property of the Owner. Third parties will be allowed to use the software as necessary for this project.
- C. Product Data: Submit manufacturer's standard product data for each system component.
- D. Manufacturer's Installation Instructions: Submit for each system component.
- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

- A. General Conditions: Requirements for submittals.
- B. Project Record Documents: Record the following information:
 - 1. Actual locations of components and record circuiting and switching arrangements.
 - 2. Wiring diagrams reflecting field installed conditions with identified and numbered, system components and devices.
- C. Operation and Maintenance Data:
 - 1. Submit replacement parts numbers.
 - 2. Submit manufacturer's published installation instructions and operating instructions.
 - 3. Recommended renewal parts list.
 - 4. Submit final calibration log.

1.6 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in the manufacture of lighting control equipment and ancillary equipment, of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Comply with NEC, NEMA, and FCC Emission requirements for Class A applications.
- C. UL Approvals: Relay panels and accessory devices are to be UL listed under UL 916 Energy Management Equipment. Configured to order or custom relay panels shall be UL Listed under UL 508, Industrial Control Panels.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

- B. The contractor shall be completely responsible for providing a system meeting this specification in its entirety. All deviations from this specification must be listed and individually signed off by the consultant.
 - 1. **Acuity Brands nLight and Traxon ecue by Osram.**

1.8 PRE-INSTALLATION MEETINGS

- A. General Conditions: Pre-installation meeting.
- B. Convene minimum two working weeks prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. General Conditions: Requirements for transporting, handling, storing, and protecting products.
- B. Accept components on site in manufacturer's packaging. Inspect for damage.
- C. Protect components by storing in manufacturer's containers indoor protected from weather.

1.10 WARRANTY

- A. General Conditions: Requirements for warranties.
- B. Furnish five year manufacturer warranty for components.

1.11 EXTRA MATERIALS

- A. General Conditions: Requirements for extra materials.
- B. Furnish 20% spare (minimum 1) of each switch type installed.
- C. Furnish 20% spare (minimum 1) of each occupancy sensor type installed.
- D. Furnish 10% spare (minimum 1) installed of each photocell type.

PART 2 PRODUCTS

2.1 RELAY PANELS

A. System Description

Lighting Control Panels shall be UL listed and consist of the following:

1. Tub: NEMA 1 and located inside conditioned enclosure as indicated on the drawings, sized to accept an interior with 6 relays and 6 0-10vdc controllers.
2. Cover: Surface or Flush as required, hinged, and lockable and with restricted access to line voltage section.
3. Interior: Barrier(s) included for separation of high voltage (class 1) and low voltage (class 2) wiring. The interior shall include intelligence boards, power supply, mechanically latched control relays and multi-pole contactors. The interiors will include the following features:
 - a. Screwless, removable, plug-in connections for all low voltage terminations.
 - b. Each relay shall be capable of individual ON/OFF control by a low voltage switch and/or occupancy sensor input.

- c. The system shall monitor true relay status; the relay status will be displayed at the onboard pilot LED and monitored by the system electronics.
 - d. Stagger the ON and OFF sequence of the relays.
 - e. Heavy Duty Relays – Mechanically latching contacts with single moving part design for improved reliability. Relays to have the following characteristics:
 - (1) 30 amp NEMA 410 electronic ballast rated and 20 amp tungsten, rated for 50,000 ON/OFF cycles at full load, Support #12 - #14 AWG solid or stranded wire and rated for 120, and 277 volts; 20 amp NEMA 410 electronic ballast rated and 20 amp tungsten 347 volts.
 - (2) 30 VAC isolated contacts for status feedback and pilot light indication.
 - (3) 14,000 amp short circuit current rating.
 - 4. Contactors shall be DIN rail mounted, four pole standard, normally open or normally closed, electrically held with 120 or 277 volt coil voltage to match panel control power voltage. Contactors shall be compatible with all lighting, ballast and HID loads and be rated for 277 volt 20 amp tungsten and 600 volt 30 amp ballast loads.
- B. Power Supply: Multi-voltage transformer assembly with enough power to supply all electronics, occupancy sensors, dataline switches, pilot lights, and photocells as necessary to meet the project requirements. Power supply to have internal over-current protection with automatic reset and metal oxide varistor protection.

2.2 SYSTEM CLOCK

- A. Provide an clock in the relay panel described in Section 2.1.
- B. The clock will be used to schedule any of the eight global channel groups in the relay panel. The clock will support all of the energy saving features required of ASHRAE 90.1 - 2001, IECC 2018, as well as all state and local energy codes.
- C. The clock will provide astronomic capabilities, time delays, blink warning, daylight savings, and holiday functions and will include a battery back up for the clock function and EEPROM for program retention. Clocks that require multiple events to meet local code lighting shut off requirements shall not be allowed.
- D. The clock shall allow unique scenario and time delays. Scenarios are:
 - 1. Scheduled ON / OFF
 - 2. Manual ON / Scheduled OFF
 - 3. Manual ON / Auto Sweep OFF (for AS-100 Switches)
 - 4. Astro ON / OFF (or Photo ON / OFF)
 - 5. Astro and Schedule ON / OFF (or Photo and Schedule ON / OFF)
- E. The clock shall include system diagnostic functions to identify devices anywhere on the network dataline, and will function as a dataline switch programming tool.
- F. Features
 - 1. Clear 8-line, 22-character per line display and a simple user interface and online help.
 - 2. Retains memory and time for a minimum of 10 years.

2.5 LOW VOLTAGE SWITCHES / PLATES

- A. Description

1. Low voltage switches shall provide a momentary signal to allow individual relay control or group control using the Group Switching card specified in Section 2.03 above. Switches shall be available in 1-button, 3-button, 5-button, or 9-button designs. The 1, 3, and 5 switch devices shall mount in a standard single gang box: the 9-switch version in a two-gang box.

B. Features

1. Switches shall be constructed of non-breakable Lexan on all exposed parts and shall include a matching screwless Lexan wall plate.
2. Individual buttons shall have a removable clear cover to allow standard 9 mm (3/8 inch) labeling tape to be used to identify the controlled loads
3. Each switch shall use an LED pilot light for the individual buttons to indicate status of the controlled relay or group of relays.

2.6 EXTERIOR PHOTOCELLS

- A. Each photocell shall be mounted in the appropriate location for measuring the available daylight. Each photocell will have a separate control/calibration module mounted separately and in an accessible location.

B. The control module shall:

1. Have a separate trip point settings. These settings will be entered via easily readable dial switches.
2. Have a fixed deadband of 10%.
3. Have a starting delay.
4. Be suitable for panel mounting.
5. Be UL listed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mount switches, occupancy sensors, and photocells as indicated on Drawings and by manufacturer's requirements.
- B. Install wiring in accordance with Section 26 05 19.
- G. Use only properly color coded, stranded wire. Install wire sizes as indicated on Drawings. Install wire in conduit in accordance with Section 26 05 33.
- H. Label each low voltage wire clearly indicating connecting relay panel. Refer to Section 26 05 53.
- I. Identify power wiring with circuit breaker number controlling load. When multiple circuit breaker panels are feeding into relay panel, label wires to indicate originating panel designation.
- J. Label each low voltage wire with relay number at each switch or sensor.

3.2 SUPPORT SERVICES

Service Description:

- A. System Startup

1. Manufacturer shall have a factory authorized technician confirm proper installation and operation of all system components. The startup requirement is intended to verify:
 - a. That all occupancy sensors are located, installed, and adjusted as intended by the factory and the contract documents.
 - b. The occupancy sensors are operating within the manufacturers specifications.
 - c. The sensors and relay panels interact as a complete and operational system to meet the design intent.
2. Manufacturer to provide minimum of one half day factory start-up at site. Additional days shall be included as required
3. Manufacturer to provide a written statement verifying that the system meets the above requirements.

K. Training

1. Manufacturer shall provide factory authorized technician to train owner personnel in the operation, programming and maintenance of the lighting control system including all occupancy sensors and controls.
2. Manufacturer shall provide minimum of one half day on site training.
3. Training shall be video recorded and provided to Owner on a DVD.

C. Factory Commissioning

1. Manufacturer shall provide factory authority technician for on site Commissioning Agent Testing. Number of days on-site shall be as necessary based on number of components and systems.
2. Factory Commissioning shall include:
 - a. Program photocell.
 - c. Program relay panels,
 - d. Program dimming panels.
 - e. Fine tune dimming controls.
 - f. Fine tune color tuning per lighting designer.
 - g. Provide scenes per lighting designer.

3.3 ADJUSTING AND CALIBRATING

- A. General Conditions: Requirements for starting and adjusting.
- B. Test each system component after installation to verify proper operation.
- C. Test relays, contactors, and switches after installation to confirm proper operation.
- D. Confirm correct loads are recorded on directory card in each panel.
- E. Provide calibration logs for all devices. Sample log shall be part of shop drawing submittal.

END OF SECTION 26 09 23

SECTION 262716 - ELECTRICAL CABINETS AND ENCLOSURES

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes hinged cover enclosures, cabinets, terminal blocks, and accessories.
- B. Related Sections:
 - 1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
 - 2. Section 26 05 33 - Raceway and Boxes for Electrical Systems.
 - 3. Section 27 05 33 - Conduits and Backboxes for Communications Systems.
 - 4. Section 28 05 33 - Conduits and Backboxes for Electronic Safety and Security.

1.2 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 2. NEMA ICS 4 - Industrial Control and Systems: Terminal Blocks.

1.3 SUBMITTALS

- A. General Conditions: Submittal procedures.
- B. Product Data: Submit manufacturer's standard data for enclosures, cabinets, and terminal blocks.
- C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

1.5 EXTRA MATERIALS

- A. General Conditions: Spare parts and maintenance products.
- B. Furnish two of each key.

PART 2 - PRODUCTS

2.1 HINGED COVER ENCLOSURES

- A. Construction: NEMA 250, Type 1 or 3R as indicated/required steel enclosure.

- B. Covers: Continuous hinge, held closed by flush latch operable by screwdriver.
- C. Furnish interior plywood panel for mounting terminal blocks and electrical components; finish with white enamel.
- D. Enclosure Finish: Manufacturer's standard enamel.

2.2 CABINETS

- A. Boxes: Galvanized steel with removable end walls.
- B. Box Size: As indicated on drawings.
- C. Backboard: Furnish 3/4 inch (19 mm) thick plywood backboard for mounting terminal blocks. Paint matte white.
- D. Fronts: Steel, flush or surface type with concealed trim clamps, door with concealed hinge, and flush lock [keyed to match branch circuit panelboard. Finish with gray baked enamel.
- E. Furnish metal barriers to form separate compartments wiring of different systems and voltages.
- F. Furnish accessory feet for free-standing equipment.

2.3 TERMINAL BLOCKS

- A. Terminal Blocks: NEMA ICS 4.
- B. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors, rated 600 volts.
- C. Signal and Control Terminals: Modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 300 volts.
- D. Furnish ground bus terminal block, with each connector bonded to enclosure.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install enclosures and boxes plumb. Anchor securely to wall and structural supports at each corner in accordance with Section 26 05 29.
- B. Install cabinet fronts plumb.

3.2 CLEANING

- A. General Conditions: Final cleaning.
- B. Clean electrical parts to remove conductive and harmful materials.
- C. Remove dirt and debris from enclosure.

- D. Clean finishes and touch up damage.

END OF SECTION 262716

SECTION 262726 - WIRING DEVICES

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes wall switches; wall dimmers; receptacles; multioutlet assembly; and device plates and decorative box covers.
- B. Related Sections:
 - 1. Section 26 05 33 - Raceway and Boxes for Electrical Systems: Outlet boxes for wiring devices.
 - 2. Section 26 05 34 - Floor Boxes for Electrical Systems: Service fittings for receptacles installed on floor boxes.
 - 3. Section 26 05 34 - Floor Boxes for Electrical Systems: Poke-through receptacles.
 - 4. Section 26 05 39 - Underfloor Raceways for Electrical Systems: Service fittings for receptacles installed in underfloor raceways.

1.2 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA WD 1 - General Requirements for Wiring Devices.
 - 2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.3 SUBMITTALS

- A. General Conditions: Submittal procedures.
- B. Product Data: Submit manufacturer's catalog information showing dimensions, colors, and configurations.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
P&S
Leviton
Hubbell
Bryant

1.5 EXTRA MATERIALS

- A. General Conditions: Spare parts and maintenance products.
- B. Furnish five of each style, size, and finish wall plate.

PART 2 - PRODUCTS

2.1 WALL SWITCHES

- A. Product Description: NEMA WD 1, Heavy-Duty, AC only general-use snap switch.
- B. Body and Handle: White plastic with toggle handle.
- C. Indicator Light: Lighted handle type switch; red color handle.
- D. Locator Light: Lighted handle type switch; red color handle.
- E. Ratings:
 - 1. Voltage: 120-227 volts, AC.
 - 2. Current: 20 amperes.

2.2 WALL MOUNTED OCCUPANCY SENSORS CONTROLS (STAND-ALONE)

- A. Dual technology (Passive Infrared/Ultrasonic) wall switch occupancy sensor. Wattstopper DW-100 (Non-dimming).
- B. 0-10vdc dual technology (Passive Infrared/Ultrasonic) wall switch occupancy sensor dimmer. (Dimming)

2.3 RECEPTACLES

- A. Product Description: NEMA WD 1, Heavy-duty specification grade receptacle.
- B. Device Body: White plastic. Unless noted otherwise.
- C. Configuration: NEMA WD 6, type as indicated on Drawings.
- D. Convenience Receptacle: Type 5-20.
- E. GFCI Receptacle: Blank or duplex 5-20, convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.
- F. Tamper Resistant, 20A, 125V, 2 pole, 3 wire grounding, single: NEMA 5-20R.
- C. USB Charging Station duplex receptacle with (1) USB Type C and (1) USB Type A charging ports, 20A, 125V. Leviton T5833 series.
- D. USB Charging Station duplex receptacle with (2) USB 60 watt Type C charging ports, 20A, 125V. Device is indicated on plans by 'C' adjacent device. Leviton T5836 series.
- E. Clock receptacle: Straight blade, duplex receptacle, no clock hanger, 20A 125V, 2-pole 3-wire grounding.
- G. Install black receptacles in above counter Lab areas with backsplash.

2.4 WALL PLATES

- A. Decorative Cover Plate: White smooth non-breakable nylon.
- B. Jumbo Cover Plate: White, smooth non-breakable nylon.

WIRING DEVICES

- C. Device plate in Gymnasium and Kitchens shall be stainless steel.
- D. Devices plates at black receptacles will be black.
- E. Weatherproof Cover Plate: Gasketed cast metal plate with hinged and gasketed metal device cover. Weatherproof when-in-use. Taymac Series MX3200 Series or equivalent.

2.5 MULTIOUTLET ASSEMBLY

- A. Multi-outlet Assembly: Wiremold 2000 series. Sheet steel metal channel with fitted cover, with pre-wired receptacles, suitable for use as multi-outlet assembly.
- B. Length: As indicated on Drawings.
- C. Receptacles: Furnish covers and accessories to accept convenience receptacles specified in this Section.
- D. Receptacle Spacing: 24". Alternating single receptacle and USB.
- E. Receptacle: Single receptacle.
- F. Receptacle Color: Gray.
- G. Channel Finish: Gray.
- H. Fittings: Furnish manufacturer's standard couplings, elbows, outlet and device boxes, and connectors

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General Conditions: Coordination and project conditions.
- B. Verify outlet boxes are installed at proper height.
- C. Verify wall openings are neatly cut and completely covered by wall plates.
- D. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

- A. Clean debris from outlet boxes.

3.3 EXISTING WORK

- A. Disconnect and remove abandoned wiring devices.
- B. Modify installation to maintain access to existing wiring devices to remain active.

- C. Clean and repair existing wiring devices to remain or to be reinstalled.

3.4 INSTALLATION

- A. Install devices plumb and level.
- B. Install switches with OFF position down.
- C. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- D. Do not share neutral conductor on load side of dimmers.
- E. Install receptacles with grounding pole on bottom.
- F. Connect wiring device grounding terminal to outlet box with bonding jumper and branch circuit equipment grounding conductor.
- G. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- H. Connect wiring devices by wrapping solid conductor around screw terminal. Install stranded conductor for branch circuits 10 AWG and smaller. When stranded conductors are used in lieu of solid, use crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under device screws.
- I. Use jumbo size plates for outlets installed in masonry walls.
- J. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.5 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes provided under Section 26 05 33 to obtain mounting heights as specified and as indicated on drawings.
- B. Dimensions are to center of box.
- C. Install wall switch 48 inches above finished floor.
- D. Install convenience receptacle 18 inches above finished floor.
- E. Install convenience receptacle 6 inches above back splash of counter. Unless noted otherwise.
- F. Install dimmer 48 inches above finished floor.
- G. Coordinate installation of wiring devices with floor box service fittings provided under Section 26 05 34.

3.6 FIELD QUALITY CONTROL

- A. General Conditions: Field inspecting, testing, adjusting, and balancing.
- B. Inspect each wiring device for defects.

WIRING DEVICES

- C. Operate each wall switch/dimmer with circuit energized and verify proper operation.
- D. Verify each receptacle device is energized.
- E. Test each receptacle device for proper polarity.
- F. Test each GFCI receptacle device for proper operation.

3.7 ADJUSTING

- A. General Conditions: Testing, adjusting, and balancing.
- B. Adjust devices and wall plates to be flush and level.

3.8 CLEANING

- A. General Conditions: Final cleaning.
- B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION 262726

SECTION 265600 - EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes exterior luminaires, poles, and accessories.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI C82.1 - American National Standard for Lamp Ballast-Line Frequency Fluorescent Lamp Ballast.
 - 2. ANSI C82.4 - American National Standard for Ballasts-for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type).
 - 3. ANSI O5.1 - Wood Poles, Specifications and Dimensions.
 - 4. ANSI_NEMA_ANSLG C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products.
- B. Illuminating Engineering Society (IES)
 - 1. IES LM-79-08
 - 2. IES LM-80-08
- C. U.S. Department of Energy
 - 1. Lighting Facts

1.3 SUBMITTALS

- A. General Conditions: Submittal procedures.
- B. Shop Drawings: Indicate dimensions and components for each luminaire not standard Product of manufacturer.
- C. Product Data: Submit dimensions, ratings, and performance data.
- D. Samples: Submit two color chips 3 x 3 inch (75 x 75 mm) in size illustrating luminaire finish color where indicated in luminaire schedule.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years [documented] experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. General Conditions: Product storage and handling requirements.

1.6 COORDINATION

- A. General Conditions: Coordination and project conditions.

- B. Furnish bolt templates and pole mounting accessories to installer of pole foundations.

1.7 MAINTENANCE MATERIALS

- A. General Conditions: Spare parts and maintenance products.
- B. Furnish (2) of each LED driver installed.
- C. Furnish touch-up paint for each different painted finish and color.

PART 2 - PRODUCTS

2.1 LUMINAIRES

- A. Product Description: Complete exterior luminaire assemblies, with features, options, and accessories as scheduled.
- B. Refer to General Conditions for product options.

2.2 LED LUMINAIRES

- A. Shall be tested according to the Illuminating Engineering Society of North America (IESNA) LM-79 and LM-80.
 - 1. Shall supply third party testing and data in compliance with Commercially Available LED Product Evaluation and Reporting (CALiPER) or National Voluntary Laboratory Accreditation Program (NVLAP).
 - 2. The testing laboratory must be listed on the U.S. Department of Energy's Solid-State Lighting website as an accredited testing laboratory.
 - 3. Manufacturers shall provide supporting evidence of lamp life calculation based on junction temperature and drive current upon request.
- B. Shall be listed and labeled in accordance with the U.S. Department of Energy Lighting Facts Program.
- C. Shall provide independent test laboratories IES photometrics which verify light levels.
- D. Correlated Color Temperature (CCT) measured in Kelvin's shall meet Nominal CCTs and tolerances as defined in ANSI_NEMA_ANSLF C78.377-2008.
 - 1. Nominal CCT: 4000 K: 3985 ± 275K

2.3 LAMPS / DRIVERS / MODULES - GENERAL

- A. Minimum Efficacy, Lamps Greater Than 100 Watts: 60 lumens/W, except where otherwise indicated or permitted by applicable code.

- B. LED drivers and modules shall be guaranteed for a period of five (5) years from the in-service date of acceptance.

2.- EXECUTION

3.1 EXAMINATION

- B. General Conditions: Coordination and Project conditions.
- C. Verify foundations are ready to receive fixtures.

3.2 INSTALLATION

- D. Install lamps and wiring.
- E. Install control wiring, cabling, interconnections, raceways and commission.
- F. Install lamps in each luminaire.
- G. Bond and ground luminaries, metal accessories and metal poles in accordance with Section 26 05 26.

3.3 FIELD QUALITY CONTROL

- A. General Conditions: Field inspecting, testing, adjusting, and balancing.
- B. Operate each luminaire after installation and connection. Inspect for improper connections and operation.

3.4 ADJUSTING

- A. General Conditions: Testing, adjusting, and balancing.
- B. Aim and adjust luminaries to provide illumination levels and distribution in conjunction with coordination with lighting design.

3.5 CLEANING

- A. General Conditions: Final cleaning.
- B. Clean photometric control surfaces as recommended by manufacturer.
- C. Clean finishes and touch up damage.

3.6 PROTECTION OF FINISHED WORK

- A. General Conditions: Protecting finished work.
- B. Relamp luminaries having failed lamps at Substantial Completion.

270543 – EXTERIOR COMMUNICATION PATHWAYS

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

- A. The Contractor shall provide all equipment, materials, labor, and services necessary to complete the exterior communication pathways and to ensure that they are in compliance with requirements stated or reasonably inferred by the Specifications and the Construction Drawings.
- B. This section includes requirements for underground conduit and communication vaults as shown on the Telecom Site Plan.
- C. Minimum requirements and installation methods are included for the following:
 - 1. PVC Conduit.
 - 2. Precast Hand Holes and Covers 15” Wide X 20” Long.
 - 3. Pull rope.

1.2 RELATED SECTIONS

- A. General: Consult all other Sections, determine the extent and character of related work, and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable system.
- B. Related Sections:
 - 1. 27 41 00: Audio Systems
 - 2. 27 11 00: Communications Equipment Room Fittings
 - 3. 27 13 00: Communications Backbone Cabling
 - 4. 27 15 00: Communications Horizontal Cabling
 - 5. 27 51 00: Emergency Communications Systems
- C. Division 1 Specifications, General and Supplementary Conditions apply to this Specification Section.

1.3 REGULATIONS AND CODE COMPLIANCE

- A. Materials and work specified herein shall comply with the requirements of Specification Section 27 01 00 and in particular the following standards and code requirements:
 - 1. ANSI/TIA-569-E: Telecommunications Pathways and Spaces (Revision E, May 2019)
 - 2. ANSI/TIA-606-D: Administration Standard for Telecommunications Infrastructure (Revision D, October 2021).
 - 3. ANSI/TIA-758-B: Customer-Owned Outside Plant Telecommunications Infrastructure Standard (Revision B, March 2012).
 - 4. ANSI/NFPA-70, 2017 -- National Electrical Code (NEC).
 - 5. Underwriter’s Laboratories, Inc. (UL).

1.4 SUBMITTALS

- A. Manufacturer's Data Sheets: Provide data sheets for the following products:
 - 1. PVC and Rigid Conduit.
 - 2. Precast Hand Holes and Covers 15" Wide X 20" Long.
- B. Bill of Materials: Submit a detailed bill-of-materials listing all manufacturers, part numbers, and quantities proposed for use on this project.
- C. As-Built Drawings: Provide as-built drawings for the outside plant conduit and vaults. Drawings must be dimensioned off curbs indicating the exact routing of the conduit and location of vaults.

PART 2 – PRODUCTS

2.1 PVC CONDUIT

- A. Provide PVC conduit as shown on the Site Plan. Conduit shall be rated for direct burial, ultraviolet resistant, and conforming to UL Standard 651, NEC 347, Federal Specification W-C-1094A, Schedule 40 or Schedule 80 as specified on drawings.
- B. PVC fittings shall be the same material as conduit and installed with watertight joint compound recommended by manufacturer.
- C. Install spacers as required to maintain proper separation between multiple conduits in a run.
 - 1. Acceptable PVC Conduit manufactured by:
 - a. Carlon
 - b. Queen City Plastics
 - c. Certainteed Corporation
 - d. Pacific Western Extruded Plastics
 - e. Georgia Pipe Company
 - f. Hubbell Incorporation
 - g. Cantex Incorporation
 - h. Triangle

2.2 PULL ROPE

- A. Pull rope shall be installed within each outside plant conduit and within each innerduct.
- B. Pull rope shall be secured at all pull points and pull boxes.

2.3 TELECOM PULL BOXES (10" WIDE X 17" LONG) NON-TRAFFIC RATED

- A. Provide reinforced precast concrete telecom pull boxes where shown on the drawings.
- B. Provide 10" wide x 17" long x 12" deep reinforced concrete pull box.

- C. Provide 10” wide x 17” long x 12” deep reinforced concrete extension.
- D. Provide reinforced concrete lockable bolt down lid.
- E. Provide additional reinforced concrete risers as required to maintain conduit depth as shown on the drawings.
- F. Acceptable Products:
 - 1. Jensen Precast HN1017-B pullbox, HN1017-E Extension and HN1017-L01 Lid.
 - 2. Or Approved Equal.

PART 3 – EXECUTION

3.1 UTILITY COORDINATION

- A. Contact local utility companies and utility locating services prior to excavation to locate and mark existing underground utilities.
- B. Coordinate conduit routing with existing underground utilities. Reroute conduit and provide horizontal and vertical offsets as required to avoid and to provide necessary clearances from existing utilities.

3.2 CONDUIT

- A. Coordinate conduit stub up locations at shade structure concrete footings so that conduits stub up into shade structure tube steel support legs.
- B. Factory-manufactured sweeps which meet ANSI/TIA-569-D bend radius requirements shall be used for all telecommunications conduit. The bend radius of the sweeps must be a minimum of 10-times the internal conduit diameter. Bending conduit in the field using manual or mechanical methods is not acceptable.
- C. OSP conduits shall be installed a minimum of 36” below finished grade. Conduits shall be encased in hard-tamped sand a minimum of 6” above and below the conduits. 3” clear space shall be maintained between conduits. Backfill above the conduits shall be installed and compacted to 95% density.
- D. Prior to installing cables, all new or unused OSP conduits must be cleaned with a brush pulled through the conduit at least two times in the same direction and swabbed with clean rags until the rag comes out of the conduit clean and dry. Conduits shall then be tested with a mandrel to prove compliance with the sweep radius requirements throughout the conduit run.
- E. All OSP conduits and innerduct shall have a 3/8” nylon pull rope installed. Pull rope shall be re-pulled each time an additional cable is installed.

3.3 PULL BOXES

- A. Install pull boxes and set covers to match finished grade.
- B. Conduits shall enter pull boxes from the side. Do not sweep conduits into the bottom of the pull box. Provide reinforced concrete pull box extensions/risers as required.

3.4 CUTTING AND PATCHING

- A. Sawcut and remove existing pavement, sidewalks, gutters, etc., to accommodate installation of outside plant conduit and pull boxes.
- B. Replace sub-base, pavement, sidewalks gutters, etc., to match existing.
- C. Repair and replace all landscaping and sitework disturbed by excavation including but not limited to irrigation lines, lawns, planting, etc. Resod lawn areas disturbed by excavation.

END OF SECTION 270543

SECTION 274100 - AUDIO SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

- A. Provide all labor, materials, equipment, tools, transportation, storage costs, programming, testing, adjusting, tuning, training and all necessary and related items as required to provide complete and operational Audio System as shown on the Drawings and described in the Specifications.
- B. The City of Sparks has an existing audio system along Victorian Avenue from Pyramid Way to Victorian Plaza Circle (approximately 4 city blocks). The system consists of an audio rack located in the Depot Gallery building near Victoria Ave and Pyramid Way. The audio rack consists of a Muzak satellite link, microphone inputs, CD player, 4-channel mixer and two (2) 2-channel 70v amplifiers (1,000 watts per channel). 14 gauge 2-conductor speaker cable is routed from the Depot Gallery to light pole mounted speakers on both sides of Victorian Avenue. The speakers are divided into 4 zones (4 city blocks).
- C. Project includes the removal of four (4) existing light pole mounted speakers and associated speaker cabling at the new Forecourt site. Seven (7) new speakers and associated speaker cable will be installed and mounted in the center of the new shade structures. Speakers will be connected to the existing speaker circuit serving the Victorian Avenue city block between 10th street and Victorian Plaza Circle.
- D. The Specifications list equipment, devices, software and programming that comprise the overall Audio System. The Contractor shall integrate all individual items so that they function together as one overall system. The Contractor shall provide all necessary equipment, cabling, software, programming and ancillary items as required to integrate all components.

1.2 RELATED SECTIONS

- A. General: Consult all other Sections, determine the extent and character of related work, and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable system.
- B. Related Sections:
 - 1. 27 05 43: Exterior Communications Pathways.
- C. Division 1 Specifications, General and Supplementary Conditions apply to this Specification Section.

1.3 REGULATIONS AND CODE COMPLIANCE

- A. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid. Consider such codes or standards a part of this Specification as though fully repeated herein.

- B. Perform all work in accordance with governing codes, rules and regulations including but not limited to the following:
1. ANSI/InfoComm.
 2. NFPA-70, 2017 -- National Electrical Code (NEC).
 3. FCC Regulations:
 4. Part 15 – Radio Frequency Devices & Radiation Limits
 5. Underwriter’s Laboratories, Inc. (UL).
 6. Americans with Disabilities Act (ADA)
 7. American Standard Code for Information Interchange (ACSI)
 8. American Society for Testing and Materials (ASTM)
 9. National Electrical Manufacturers' Association (NEMA)

1.4 QUALITY ASSURANCE

A. Contractor Qualifications:

1. The contractor shall be licensed by the Nevada State Contractors Board.
 2. The Contractor shall have a minimum of five (5) years experience in the installation, integration and testing of Audio Visual Systems of similar size and scope.
 3. The Contractor shall be a firm normally engaged in the design, installation and maintenance of Audio Visual Systems. The Contractor shall provide details of at least three (3) projects of similar size and scope involving the design, installation and testing of Audio Visual Systems in the last 5 years. Names, addresses and telephone numbers of references for the three projects shall be included.
 4. The Contractor shall have service facilities near the project site and shall respond to service phone calls within one (1) business day of receipt. The Contractor shall provide an on-site response time of two (2) business days for critical system items during regular business hours.
- B. UL Listing and Labeling: Unless specific equipment specified within the Audio Visual Specifications is not listed or labeled by UL, provide components listed and labeled by UL.
- C. All work shall conform to the National Electrical Code (NEC) and to applicable National Fire Protection Association (NFPA) codes.
- D. Compliance with Local Requirements: Comply with the applicable building code, state and local ordinances, and regulations and the requirements of the authority having jurisdiction.
- E. All equipment supplied shall be listed by a nationally recognized test laboratory where applicable.
- F. All equipment and accessories to be the product of a manufacturer regularly engaged in its manufacture.
- G. All items of a given type shall be the products of the same manufacturer.
- H. All items shall be of the latest technology; no discontinued models or products are acceptable.

- I. The manufacturer, or their Authorized Representative, shall confirm that within 300 miles of the project site there is an established agency which:
 1. Stocks a full complement of parts.
 2. Offers service during normal working hours as well as emergency service on all equipment to be furnished.
 3. Will supply parts and service without delay and at reasonable cost.
 4. Contractor shall be capable of performing service or maintenance work on these specified or accepted systems. Contractor shall be factory-certified where such certification is available or required.

1.5 INTENT OF DRAWINGS

- A. Layout: Follow the general layout shown on the Drawings except where other work may conflict with the Drawings.
- B. Accuracy: The Drawings show a diagrammatic representation of the system. Field verify all dimensions and locations.
- C. Provide detailed point-to-point wiring and block diagrams of the entire Audio Visual System. Submit cut sheets of all equipment, equipment enclosures, devices, cabling, software, etc. for review approval prior to installing the work.

1.6 REVIEW OF SPECIFICATIONS

- A. The Contractor shall carefully study and compare the Drawings and Specifications and shall at once report to the Owner or Owner's Representative any error, inconsistency or omission discovered. If the Contractor performs any construction activity knowing it involves a recognized error, inconsistency or omission in the Specifications without such notice to the Owner or Owner's Representative, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the cost for any correction.

1.7 EXAMINATION OF THE PREMISES

- A. The Contractor shall visit the Site to become familiar with the local conditions under which the work is to be performed and correlate observations with the requirements of the Drawings and Specifications. No allowance will be made for claims of concealed conditions which the Contractor learned or should have learned in exercising due diligence in its observations of the site and review of the local conditions.
- B. Before ordering any materials or performing any work, the Contractor shall verify all measurements and be responsible for correctness of same. No extra charge or compensation will be allowed for duplicate work or material required because of an unverified difference between an actual dimension and the measurement indicated in the Drawings. Any discrepancies found shall be submitted in writing to the Owner or Owner's Representative for consideration before proceeding with the work.

1.8 AUDIO VISUAL SYSTEM INTEGRATION

- A. The Contractor will be responsible for integrating each individual system component so that the systems function as one overall Audio Visual System.
- B. The Contractor shall provide all necessary programming, software, software licensing, software development kits (SDK's), cabling, AV equipment and ancillary items required to achieve this integration.
- C. Where more than one acceptable manufacturer is listed for a specific A/V component, the Contractor will be responsible for verifying that the manufacturer's equipment can be integrated into the overall Audio Visual System.

1.9 SUBMITTALS

- A. Submit manufacturer product data sheets for all system components and cabling.
- B. Product Data Sheet Submittals shall comply with the following:
 - 1. Product data submittals must be submitted to and approved by the Owner prior to release of order for equipment and prior to installation.
 - 2. Submit product data sheets in electronic PDF format.
 - 3. Provide the following information in the submittal:
 - a. Client Name.
 - b. Project Number and Contract Number.
 - c. Project Name and Address.
 - d. Contractor's Submittal Number.
 - e. Submittal Title.
 - f. Specification Section Number.
 - g. Date of Submittal.
 - h. Contractor Name and contact information.
 - 4. Provide a table of contents indicating the products submitted.
 - 5. Products listed in the table of contents should be in the same order as they appear in the Specifications.
 - 6. Submittals must include all items identified in each specification section. Partial submittals will not be accepted.
 - 7. Where product data sheets cover more than one distinct item, clearly indicate by arrows or brackets precisely what is being submitted including optional accessories. Delete or cross-out non-applicable data.
- C. As-Built Drawings
 - 1. See Division 1 Specifications for additional record drawing requirements.
 - 2. Content:
 - a. Fully represent actual installed conditions and incorporate all revisions made during the course of construction.
 - b. Include drawings submitted as part of the Shop Drawing package, plus any additional information required to accurately document installed conditions.
 - c. Device addresses & IP address information.

d. Floor plans shall show:

- (1) Locations and identifiers of all devices.
- (2) Size, quantity, location, and routes of all conduit pathways

1.10 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery.

1. Do not deliver products to the site until protected storage space is available. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at jobsite.
2. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels (name of the manufacturer, product name, type, grade, UL classification, etc.) intact.
3. Replace materials damaged during shipping at no cost to the Owner.

B. Storage.

1. Store materials in clean, dry, ventilated space free from temperature and humidity conditions (as recommended by manufacturer) and protected from exposure to harmful weather conditions.
2. Comply with manufacturer's requirements for each product. Comply with recommended procedures, precautions or remedies as described in the Material Safety Data Sheets (MSDS) as applicable.
3. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris, and traffic.
4. Storage outdoors covered by rainproof material is not acceptable.
5. Provide heat where required to prevent condensation or temperature related damage.

C. Handling.

1. Handle in accordance with manufacturer's written instructions.
2. Damaged equipment shall not be installed.
3. Replace damaged equipment at no cost to the Owner.
4. Handle with care to prevent internal component damage, breakage, denting, and scoring.

1.11 SUBSTITUTIONS

- A. No material substitutions will be allowed except by written acceptance from the Owner's Representative. Specified catalog numbers are used for description of equipment and standard of quality only. Equivalent material will be given consideration only if adequate comparison data including samples are provided.
- B. Approval of alternate or substitute equipment or material in no way voids the Specification requirements.
- C. Under no circumstances shall the Owner's Representative be required to prove that an item proposed for substitution is not equal to the specified item. It shall be mandatory that the Contractor submit to the Owner or Owner's Representative all evidence to support the contention that the item

proposed for substitution is equal to the specified item. The Owner's decision as to the equality of substitution shall be final and without further recourse.

1.12 WARRANTY

- A. The warranty period will begin after substantial completion of the project.
- B. The complete Audio / Visual System including all devices, equipment, software and programming shall be guaranteed to be free from defects in workmanship and materials for a minimum period of one (1) year from date of substantial completion. Promptly remedy such defects and any subsequent damage caused by the defects or repair thereof at no expense to the Owner.

PART 2 -PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. All products must be new and unused and without blemish or defect.
- B. All products used in parts replacement shall meet the specifications for the original equipment.
- C. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts are available.
- D. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that a complete and fully operational system will result.
- E. The contractor shall download and install the most current "stable" firmware version from the manufacturer's website for each device and piece of equipment (where applicable).

2.2 70V 50 WATT OUTDOOR SURFACE MOUNTED LOUDSPEAKER

- A. Provide loudspeakers with the following physical characteristics:
 - 1. All weather marine grade stainless steel construction.
 - 2. IEC 529 IP 56 ingress protection.
 - 3. Speaker cabinet and mounting brackets color black.
 - 4. Stainless steel powder coated perforated grille (color black).
 - 5. 2-way 6.5" diameter woofer and 1.75" high frequency compression driver.
 - 6. Built in 50-Watt 70 volt multi-tap transformer.
 - 7. 50 watt transformer. Power taps 50, 25, 12.5 watts.
 - 8. 89dB sensitivity (1W/1m).
 - 9. 80Hz -20kHz Frequency response.
 - 10. 110 degree horizontal x 70 degree vertical coverage pattern.
 - 11. 4-position terminal strip with pass through.
 - 12. Approximate dimensions: 12.3" high x 7.3" wide x 8.5" deep.
 - 13. 5-year manufacturer warranty.

- B. Provide all required mounting hardware to secure speaker to metal shade structure and properly aim speaker.
- C. Acceptable products:
 - 1. One Systems 106.HTH speaker (color black) with PT10.M stainless steel pan/tilt mounting bracket (color black).
 - 2. Or Approved Equal.

2.3 14/2 LOUDSPEAKER CABLING

- A. Provide loudspeaker cabling with the following physical characteristics:
 - 1. #14 AWG 2-conductor speaker cable.
 - 2. Stranded bare copper conductors.
 - 3. PVC conductor insulation (color code black, white).
 - 4. PVC jacket with waterblock tape.
 - 5. Indoor / Outdoor rated suitable for underground wet duct installation.
 - 6. Operating Temperature: -30C to +75C
 - 7. 600V RMS UL voltage rating.
- B. All speaker cabling to be routed in conduit with the exception of the cabling within the shade structure. Cabling shall be routed within the shade structure support tube steel to the speaker mounting location.
- C. Acceptable Products:
 - 1. Belden P/N 8814WB.
 - 2. Or approved equal.

PART 3 -EXECUTION

3.1 INSTALLATION

- A. General: Install systems and equipment in accordance with applicable codes. Install equipment in accordance with manufacturer's written instructions. Systems shall be complete and operational in all respects.
- B. Provide all required supports to mount and aim the speakers within the shade structures. Speakers shall be mounted so that the speaker grille is parallel to and within 1” of the shade structure front perforated metal grille. All mounting hardware shall be stainless steel.
- C. Connect new speaker cabling to existing speaker circuit located in the existing pull box located in the center median. Provide water proof splice to connect new cabling to the existing circuit.

- D. Adjust amplifier channel attenuation at existing Depot Gallery building audio rack. Tap speakers to provide adequate sound pressure levels along Forecourt sidewalk and landscaping areas (approximately 10dB above ambient noise level).

3.2 A/V SYSTEM TESTING AND COMMISSIONING

- A. Test and demonstrate all equipment and system functionality at the completion of the project.
- B. Testing and commissioning includes but is not limited to the following:
 - 1. Confirm the installation, mounting and support of all devices and equipment.
 - 2. Verify installation, termination and connection of all A/V cabling.
 - 3. Verify switching and control of all audio and video signals.
 - 4. Verify audio levels in all spaces.
 - 5. Verify labeling of all equipment and cabling.
 - 6. Verify the documentation of all equipment, devices and cabling in the as-built drawings and O&M manuals.

END OF SECTION 274100

SECTION 328400 – LANDSCAPE IRRIGATION

PART 1 - GENERAL

1.01 SCOPE

- A. Furnish all labor, materials, supplies, equipment, tools and transportation, and perform all operations in connection with and reasonably incidental to the complete installation of the irrigation system, and guarantee/warranty as shown on the drawings, the installation details, and as specified herein.

1.02 ITEMS OF WORK INCLUDED

- A. Items of work specifically included are:
 - 1. Coordination of Utility Location. (“Call Before You Dig”)
 - 2. Verification of existing static pressure and flow rate.
 - 3. Installation, connection of all sensors, and programming of irrigation controller.
 - 4. Connection of electrical power supply to the irrigation control system.
 - 5. Maintenance period.
 - 6. Sleeving for irrigation pipe and wire.

1.03 ITEMS OF WORK NOT INCLUDED

- A. Items of work specifically excluded are:
 - 1. Procurement of all applicable licenses, permits, and fees including payment of all development, plant investment, or any other fees and permits associated with the purchase and installation of the tap.
 - 2. Excavation, installation and backfill of tap into municipal water line.
 - 3. Excavation, installation and backfill of water meter and vault.
 - 4. Installation and connection to irrigation central control system.
 - 5. Provision of electrical power supply to the irrigation control system.
 - 6. Installation of pumping plant for irrigation system.

1.04 RELATED WORK

- A. Division 00 00 00 – Procurement and Contracting Requirements
 - 1. 00 01 15 – List of Drawing Sheets
- B. Division 01 00 00 – General Requirements
 - 1. 01 10 00 – Summary
 - 2. 01 11 00 – Summary of Work

- 3. 01 33 23 – Shop Drawings, Product Data, and Samples
- C. Division 02 00 00 – Existing Conditions
- D. Division 32 90 00 – Planting

1.05 SUBMITTALS

- A. Submit samples under provisions of Contract Documents
- B. Deliver four (4) copies of all required submittals to the Owners' Representative within fifteen (15) days from the date of the Notice to Proceed.
- C. Materials List: Include, pipe, fittings, mainline components, water emission components, control system components and all other components needed to construct a fully operating automatic irrigation system. At a minimum include all components specifically identified on the irrigation drawings. Quantities of materials need not be included.
- D. Manufacturers' Data: Submit manufacturers' catalog cuts, specifications, and operating instructions for equipment shown on the materials list. Highlight specific items to be utilized for construction of the irrigation system.
- E. Shop Drawings: Submit shop drawings called for in the installation details. Show products required for proper installation, their relative locations, and critical dimensions. Note modifications to the installation detail.
- F. Project Record Drawings: Submit project record (As-Built) drawings to Owner prior to commencement of maintenance period per Contract Documents. Accurate and complete project record drawings will be required before the maintenance period begins.

1.06 RULES AND REGULATIONS

- A. Work and materials shall be in accordance with the latest edition of the National Electric Code, the Uniform Plumbing Code as published by the Western Plumbing Officials Association, and applicable laws and regulations of the governing authorities.
- B. When the contract documents call for materials or construction of a better quality or larger size than required by the above-mentioned rules and regulations, provide the quality and size required by the contract documents.
- C. If quantities are provided either in these specifications or on the drawings, these quantities are provided *for information only*. It is the Contractor's responsibility to determine the actual quantities of all material, equipment, and supplies required by the project and to complete an independent estimate of quantities and wastage.

1.07 TESTING

- A. Notify the Owners' Representative three (3) days in advance of any testing.
- B. Pressure Test:
 - 1. Pipelines jointed with rubber gaskets or threaded connections may be subjected to a pressure test at any time after partial completion of backfill. Pipelines jointed with solvent-welded PVC joints shall be allowed to cure a minimum of 24 hours before testing. Pipelines installed with thrust blocks shall have the concrete cured for a minimum of seven (7) days

before testing.

2. Subsections of mainline pipe may be tested independently, subject to the review of the Owners' Representative.
3. Furnish clean, clear water, pumps, labor, fittings, and all equipment necessary to conduct tests or retests.
4. The test pressure shall not exceed the rated working pressure of the pipe.
 - a. Hydrostatic Pressure Test:
 - 1) Fill mainline pipe with water, purge all air out of the system. Subject mainline pipe to a hydrostatic pressure of 150 PSI for two hours. Test with mainline components installed. A 2 PSI pressure variation is allowed.
 - i. The use of an air compressor to provide pressure is not allowed.
 - 2) Fill lateral pipe with water, purge all air out of the system. Subject lateral pipe to a hydrostatic pressure of 75 PSI. Test with risers for sprinklers capped.
 - i. The use of an air compressor to provide pressure is not allowed.
 - 3) Backfill to prevent pipe from moving under pressure. Expose couplings and fittings.
 - 4) Leakage will be detected by visual inspection. Replace defective pipe, fitting, joint, valve, or appurtenance. Repeat the test until the pipe passes test.
 - i. Cement or caulking to seal leaks is prohibited.
 - 5) The Owners' Representative reserves the option to furnish the gauges and metering devices for the tests.
 - b. Volumetric Leakage Test:
 - 1) Cap risers of mainline components for volumetric pressure tests. Backfill to prevent pipe from moving under pressure. Expose couplings and fitting.
 - 2) Fill mainline pipe with water and purge all air from the pipeline before test.
 - 3) Subject mainline pipe to a hydrostatic pressure of 150 PSI for two hours. Maintain constant pressure.
 - i. The use of an air compressor to provide pressure is not allowed.
 - 4) The amount of additional water added to maintain constant pressure during the test shall not exceed the following amounts:
 - i. The formula for calculating allowed leakage is:
 - a)
$$L = \frac{S * D * \sqrt{P}}{148,000}$$

L = Allowable leakage in Gallons Per Hour
S = Length of pipe in Feet
D = Nominal pipe diameter in Inches
P = Average test pressure, PSI

- b) If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each pipe size and associated length.

Test Pressure (PSI)	Allowable Leakage per 1000 feet of pipe* length - Gallons Per Hour										
	Nominal Pipe Diameter - Inches										
	3	4	6	8	10	12	14	16	18	20	24
100	0.20	0.27	0.41	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.62
125	0.23	0.30	0.45	0.60	0.76	0.91	1.06	1.21	1.36	1.51	1.81
150	0.25	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.99
175	0.27	0.36	0.54	0.72	0.89	1.07	1.25	1.43	1.61	1.79	2.15
200	0.29	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.72	1.91	2.29
	* If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.										

- 5) Measure the volume of water using a calibrated container with a resolution of one (1) ounce of water.
- 6) Replace defective pipe, fitting, joint, valve, or appurtenance. Repeat the test until the pipe passes test.
 - i. Cement or caulking to seal leaks is prohibited.
- 7) The Owners' Representative reserves the option to furnish the gauges and metering devices for the tests.

C. Operational Test:

1. Prior to the Operational Test connect and configure all system sensors.
 - a. All rain, wind, temperature, weather or other sensors specified on the plan shall be installed, connected, and fully operational.
2. Activate each remote-control valve in sequence from controller. The Owners' Representative will visually observe operation, water application patterns, and leakage.
3. Replace defective remote-control valve, solenoid, wiring, or appurtenance to correct operational deficiencies.
4. Replace, adjust, or move water emission devices to correct operation or coverage deficiencies.
5. Replace defective pipe, fitting, joint, valve, sprinkler, or appurtenance to correct leakage problems.
6. Cement or caulking to seal leaks is prohibited.
7. Repeat test(s) until each lateral passes all tests.
8. The Owners' Representative will measure and record static and dynamic pressure at the point of connection and in the system mainline at various locations.
9. The Owner's Representative will measure and record dynamic pressure at various sprinklers and water emission devices.

1.08 CONSTRUCTION REVIEW

- A. The purpose of on-site reviews by the Owners' Representative is to periodically observe the work in progress and the Contractor's interpretation of the construction documents and to address questions with regards to the installation.
 - 1. Scheduled reviews such as those for irrigation system layout or testing should be scheduled with the Owners' Representative as required by these specifications.
 - 2. Impromptu reviews may occur at any time during the project.
 - 3. Final review will occur at the completion of the irrigation system and Record Drawing (As-Built) submittal.

1.09 GUARANTEE/WARRANTY AND REPLACEMENT

- A. The purpose of this guarantee/warranty is to ensure that the Owner receives irrigation materials of prime quality, installed and maintained in a thorough and careful manner.
 - 1. For a period of one year from commencement of the formal maintenance period, guarantee/warranty irrigation materials, equipment, and workmanship against defects. Fill and repair depressions. Restore landscape or structural features damaged by the settlement of irrigation trenches or excavations. Repair damage to the premises caused by a defective item. Make repairs within seven (7) days of notification from the Owners' Representative.
 - 2. Costs for all guarantee/warranty work shall be entirely paid for by the Contractor.
 - 3. Contract documents govern replacements identically as with new work. Make replacements at no additional cost to the contract price.
 - 4. Guarantee/warranty applies to originally installed materials and equipment and replacements made during the guarantee/warranty period.

PART 2 - MATERIALS

2.01 QUALITY

- A. Use materials that are new and without flaws or defects of any type and are the best of their class and kind.

2.02 SUBSTITUTIONS

- A. Pipe sizes referenced in the Construction Documents are minimum sizes and may be increased at the option of the Contractor. Substitutions in pressure class of pipe shall be approved by the Irrigation Designer.

2.03 SLEEVING

- A. Install separate sleeve beneath paved areas to route each run of irrigation pipe or wiring bundle.
- B. Sleeving material beneath pedestrian pavements shall be PVC Class 200 bell end pipe with solvent welded joints.
- C. Sleeving beneath drives and streets shall be PVC Class 200 bell end pipe with solvent welded joints.
- D. Sleeving diameter: As indicated on the drawings and installation details or equal to twice the nominal diameter of the pipe or wiring bundle passing through.
 1. Furnish and install size sleeves for wiring bundles per the current NEC Conduit Fill calculations and charts.

2.04 PIPE AND FITTINGS

- A. Mainline Pipe and Fittings:
 1. Use rigid, unplasticized polyvinyl chloride (PVC) round pipe, National Sanitation Foundation (NSF) approved, extruded from material meeting the requirements of Cell Classification 12454 as defined in ASTM Standard D1784, with an integral belled end.
 2. Use Class 200, SDR-21, rated at 200 PSI, conforming to the dimensions and tolerances established by ASTM Standard D2241 and ASTM Standard D2672. Use PVC pipe rated at higher pressures than Class 200 in the case of small nominal diameters which are not manufactured in Class 200.
 - a. Use solvent weld pipe for mainline pipe with a nominal diameter less than 3-inches or where a pipe connection occurs in a sleeve. Use Schedule 40/80, Type 1, Cell Classification 12454, PVC solvent weld fittings conforming to ASTM Standard D1784 and ASTM Standard D2466 (Schedule 40)/D2467 (Schedule 80). All belled end pipe shall have tapered sockets to create an interference type fit, which meet or exceed the dimensional requirements and minimum socket length for pressure type sockets as defined by ASTM Standard 2672. Use primer specifically approved by the pipe manufacturer. Solvent cement to conform to ASTM Standard D2564.
 - b. Use Schedule 40/80 conforming to the dimensions and tolerances established by ASTM Standard D1785. All belled end pipe shall have tapered sockets to create an interference

type fit, which meet or exceed the dimensional requirements and minimum socket length for pressure type sockets as defined by ASTM Standard 2672.

3. Use UV radiation resistant polyethylene pipe (200 PSI) manufactured from Dow Chemical FINGERPRINT DFDA-7510NT polyethylene resin manufactured by Dow Chemical or a Dow Chemical Licensee with a minimum of 2% carbon black or approved UV stabilizer, and minimum nominal pipe ID dimension of 0.810" for 3/4-inch pipe.
 - a. Use Type 1, cell classification 12454PVC as defined in ASTM Standard D1784 insert fittings conforming to ASTM Standard D2609 designed for use with flexible polyethylene (PE) pipe.

B. Lateral Pipe and Fittings:

1. Use rigid, unplasticized polyvinyl chloride (PVC) round pipe, National Sanitation Foundation (NSF) approved, extruded from material meeting the requirements of Cell Classification 12454 as defined in ASTM Standard D1784, with an integral belled end.
2. Use Class 200, SDR-21, rated at 200 PSI, conforming to the dimensions and tolerances established by ASTM Standard D2241. Use PVC pipe rated at higher pressures than Class 200 in the case of small nominal diameters that are not manufactured in Class 200. All belled end pipe shall have tapered sockets to create an interference type fit, which meet or exceed the dimensional requirements and minimum socket length for pressure type sockets as defined by ASTM Standard 2672.
 - a. Use Schedule 40/80 conforming to the dimensions and tolerances established by ASTM Standard D1785. All belled end pipe shall have tapered sockets to create an interference type fit, which meet or exceed the dimensional requirements and minimum socket length for pressure type sockets as defined by ASTM Standard 2672. All belled end pipe shall have tapered sockets to create an interference type fit, which meet or exceed the dimensional requirements and minimum socket length for pressure type sockets as defined by ASTM Standard 2672.
 - 1) Use Schedule 40/80, Type 1, Cell Classification 12454, PVC solvent weld fittings conforming to ASTM Standard D1784 and ASTM Standard D2466 (Schedule 40)/D2467 (Schedule 80).
 - b. Use primer approved by the pipe manufacturer. Solvent cement to conform to ASTM Standard D2564, of a type approved by the pipe manufacturer.
 - 1) Solvent welded pipe shall not be installed when the outside temperature drops below forty-five (45) degrees Fahrenheit.
 - c. Flexible high-density polyethylene (HDPE) pipe is an alternate to rigid PVC pipe.
 - 1) HDPE SDR-11 (200 PSI) polyethylene is an acceptable alternative to Class 200 PVC pipe for laterals. HDPE pipe sizes to be used are 1-inch, 1.25-inch, 1.5-inch, 2-inch, 3-inch and 4-inch, IPS sized and outside diameter controlled. HDPE pipe shall conform to ASTM D3035 and be manufactured to IPS dimensions. HDPE pipe shall be compatible with heat fusion welding.
 - 2) Use SDR-11.5, PE23, rated at 100 PSI that is National Sanitation Foundation (NSF) approved, conforming to ASTM Standard D2239.
 - 3) Use SDR-15, PE23, rated at 80 PSI that is National Sanitation Foundation (NSF) approved, conforming to ASTM Standard D2239.
 - 4) Use Type 1, cell classification 12454PVC as defined in ASTM Standard D1784

insert fittings conforming to ASTM Standard D2609 designed for use with flexible polyethylene (PE) pipe. Use stainless steel pinch clamps or worm gear clamps (including stainless steel screw) to join pipe and fittings.

- d. For drip irrigation laterals downstream of remote control valves, use UV radiation resistant polyethylene pipe manufactured from Dow Chemical FINGERPRINT DFDA-7510NT polyethylene resin manufactured by Dow Chemical or a Dow Chemical Licensee with a minimum of 2% carbon black or approved UV stabilizer, and minimum nominal pipe ID dimension of 0.810" for 3/4-inch pipe.
 - 1) Use Type 1, cell classification 12454PVC as defined in ASTM Standard D1784 insert fittings conforming to ASTM Standard D2609 designed for use with flexible polyethylene (PE) pipe.

C. Specialized Pipe and Fittings:

1. Copper pipe: Use Type K drawn temper (hard or rigid) copper pipe conforming to ASTM Standard B88.
 - a. Use wrought copper or cast bronze fittings that are dezincification resistant and conform to ASTM Standard B75, soldered or threaded per the installation details. Use a 95% tin and 5% antimony solder. Use a thread sealant approved by the pipe manufacturer.
2. Galvanized steel pipe: Use Schedule 40/80 conforming to ASTM Standard A123.
 - a. Use galvanized, threaded, Class 150, malleable iron fittings conforming to ASME Standard B16.3 and ASTM Standard A123.
3. Ductile iron pipe: Use ductile iron pipe with a minimum pressure class rating of 200 PSI and meeting the requirements of ANSI/AWWA Standard C151/A21.51 and ANSI/AWWA Standard C150/A21.50.
 - a. Use ductile iron fittings with a minimum pressure class rating of 200 PSI and meeting the requirements of ANSI/AWWA Standard C153/A21.53.
 - b. Rubber Gasket joints shall meet the requirements of ANSI/AWWA Standard C111/A21.11.
 - c. Install all ductile iron pipe in accordance with ANSI/AWWA Standard C600.
4. Use a dielectric union wherever a copper-based metal (copper, brass, bronze) is joined to an iron-based metal (iron, galvanized steel, stainless steel).
5. Assemblies calling for pre-fabricated swing joints shall utilize SPEARS swing joints or approved equal. Swing joints shall be rated at 315 psi, and use O-ring, Buttress thread and street elbow construction.
6. Low Density Polyethylene Hose:
 - a. Use pipe specifically intended for use as a flexible swing joint.
 - 1) Inside diameter: 0.490+0.010 inch
 - 2) Wall thickness: 0.100+0.010 inch
 - 3) Color: Black
 - 4) Pressure Rating: 80 PSI
 - b. Use spiral barb fittings supplied by the same manufacturer as the hose.

7. Assemblies calling for threaded pipe connections shall utilize PVC Schedule 80 nipples and PVC Schedule 80 threaded fittings.
8. Joint sealant:
 - a. Use only Teflon-type tape pipe joint sealant on plastic threads. Use nonhardening, nontoxic pipe joint sealant formulated for use on water-carrying pipes on metal threaded connections.
9. Marking Tape:
 - a. Mainline Pipe - Christy underground I.D. tape TA.DT.6.P.NPW.

2.05 MAINLINE COMPONENTS

- A. Main System Shutoff Valve: As per local practice and in compliance with local code.
- B. Winterization Assembly: As per local practice and in compliance with local code.
- C. Isolation Gate Valve Assembly: As presented in the installation details.
- D. Quick Coupling Valve Assembly: As presented in the installation details, install at a height where key can be inserted, turned and valve pressurized without removing threaded handle.

2.06 DRIP IRRIGATION COMPONENTS

- A. Remote Control Valve (RCV) Assembly for Drip Laterals:
 1. As presented in the installation details. Use wire connectors and waterproofing sealant to join control wires to solenoid valves. Use standard identifications tags marked with controller name and station number. Install a separate valve box over a 3-inch depth of washed pea gravel for each assembly. Use 8-ounce minimum weight non-woven geotextile fabric underneath pea gravel and box assembly to prevent dirt and debris intrusion. Adjust valve flow control per manufacturer's recommendations prior to use.
- B. Drip Emitter Assembly:
 1. Barb-mounted, vortex and/or pressure compensating emitter device as presented in the installation details. The device shall be Rain Bird Xeri-Bug XB-10PC series.
 2. Install emitter types and quantities on the following schedule:
 - a. Ground cover plant: 1 single outlet emitter each or 1 single outlet emitter per square foot of planting area, whichever is less.
 - b. Shrub: 2 single outlet emitters each.
 - c. Tree: 4 single outlet emitters each or 1 multi-outlet emitter each (with 4 outlets open).
 3. Use 1/4-inch diameter flexible plastic tubing to direct water from emitter outlet to emission point. Length of emitter outlet tubing shall not exceed five feet. Secure emitter outlet tubing with tubing stakes and install bug cap, both items manufactured by emitter manufacturer.
 4. Install an access sleeve for each multiple-outlet emitter located in a turf area.
- C. Flush Cap Assembly
 1. As presented in the installation details. Locate at the end of each drip irrigation lateral pipe. Install a separate valve box over a 3-inch depth of pea gravel for each assembly. Use 8-

ounce minimum weight non-woven geotextile fabric underneath pea gravel and box assembly to prevent dirt and debris intrusion.

2.07 CONTROL SYSTEMS COMPONENTS

A. Irrigation Controller Unit:

1. As presented in the drawings and installation details.
2. Controller Lightning protection: 8-foot copper-clad grounding rod.
3. Controller Lightning protection: 4" x 96" x 0.0625" copper-clad grounding plate.
4. Wire markers: Pre-numbered or labeled with indelible non-fading ink, made of permanent, non-fading material.
5. Valve output surge protection arrestors: As recommended by controller manufacturer.
 - a. At a minimum, ground two-wire path every 10 decoders or 1,000 feet of wire, or per manufacturer specifications, whichever requires more grounding.
6. Ground the end of every wire run per manufacturer specifications.

B. Instrumentation:

1. As presented in the drawings and installation details.
2. Rain Sensor: WR2/RFC as manufactured by Rain Bird Sprinkler Corporation.

C. Control Wire:

1. Use American Wire Gauge (AWG) No.12/14 solid copper conforming to ASTM B-3 or ASTM B-8. Type UF or PE cable, UL approved for direct underground burial from the controller unit to each remote-control valve. Use American Wire Gauge (AWG) No.12 wire for common wire.
 - a. Type PE Cable:
 - 1) Minimum temperature rating of 60⁰ C and 600 volts.
 - 2) Minimum insulation thickness of 0.060".
 - 3) Sunlight resistant, testing at 300 hours of carbon-arc or xenon-arc exposure.
 - 4) Cold Bend Test: Insulation shall not show any cracks when sample is bent around a 3X mandrel after being subjected to minus 25⁰ C for four (4) hours.
 - 5) Insulation shall not absorb more than 25mg mass of water per square inch.
 - b. Type UF/TWU Cable:
 - 1) Minimum temperature rating of 60⁰ C and 600 volts.
 - 2) Minimum insulation thickness of 0.060" for wires 14AWG to 10AWG, minimum insulation thickness of 0.080" for wires 8AWG to 2AWG.
 - 3) Cold Bend Test: Insulation shall not show any cracks when sample is bent around a 3X mandrel after being subjected to minus 25⁰ C for four (4) hours.
 - c. Wire Color for Conventional Wire Controllers:
 - 1) Common White

- | | |
|-------------------------------------|--------|
| 2) Turf | Green |
| 3) Native Seed | Orange |
| 4) Drip to Shrubs | Yellow |
| 5) Drip to Trees | Red |
| 6) Drip to Planters/Pots/Perennials | Blue |
| 7) Spare Wires | Purple |
| 8) Tracer Wire | Pink |

- D. Splices: Use wire connectors with waterproof sealant. Wire connector to be of UV radiation resist plastic construction consisting of two pieces, one piece which snap locks into the other. Connector shall be pre-filled with non-hardening silicone gel. Utilize twist style wire connector provided with assembly to connect wires.
1. Wire connectors to meet requirements of UL Standard 486D
 2. Utilize DBR/Y-600 Black Splices
 3. Encase wiring not located near PVC irrigation pipe in PVC Schedule 80 electrical conduit. Utilize long sweep elbows for changes of direction.
- E. Warning tape: Detectable Warning Tape reading “Caution: Buried Electrical Line Below” shall be inert plastic film highly resistant to alkalis, acids, or other destructive chemical components likely to be encountered in soils. Tape shall be six inches wide, colored red.
- F. Existing Control Wire: It is assumed that existing 24 VAC control wire, two-wire path and sensor wire between existing controller sensors and between the controllers and solenoid valves is in workable condition. Any concerns are to be brought to the attention of the Owner prior to installation of the replacement controller.

2.08 OTHER COMPONENTS

- A. Tools and Spare Parts: Provide operating keys, servicing tools, test equipment, other items and spare parts indicated in the General Notes of the drawings.
1. Additionally, provide the following:
 2. Two operating keys for each type and size of manually operated valve.
 3. Two keys for each type and size of quick coupler.
 4. Two 3" diameter pressure gauges and associated fittings to measure system pressure and pressure at spray, rotary and rotor type sprinklers and remote-control valves. Pressure gauge shall have a range of 0-160 PSI.
 - a. Two sets of keys for each controller, enclosure or equipment that requires keyed access.
 5. If required, keys shall be keyed to match other locks that the Owner possess.
 - a. All instruction manuals, repair manuals, operating manuals and original paper work related to the products that were installed during construction of the irrigation system.
- B. Owner Stock: Include the following for owner stock for future replacements.
1. Three (3) of each type of drip operation indicator.
 2. Ten (10) of each type of drip emitter.

3. Ten (10) sets of waterproof connectors.
4. Five (5) of each type and size of fitting; inline emitter, point source drip, sprinkler, sprinkler lateral and mainline.

PART 3 - EXECUTION

3.01 INSPECTION AND REVIEWS

- A. Site Inspections:
 - 1. Verify site conditions and note irregularities affecting work of this section. Report irregularities to the Owners' Representative prior to beginning work.
 - 2. Beginning work of this section implies acceptance of all existing conditions.
 - 3. Contractor will be held responsible for coordination between landscape and irrigation system installation.
 - 4. Landscape material locations shown on the Landscape Plan shall take precedence over the irrigation system equipment locations. If irrigation equipment is installed in conflict with the landscape material locations shown on the Landscape Plan, the Contractor will be required to relocate the irrigation equipment, as necessary, at Contractor's expense.
- B. Utility Location (Call Before You Dig)
 - 1. Arrange for and coordinate with local authorities the location of all underground utilities.
 - 2. Repair any underground utilities damaged during construction. Make repairs at no additional cost to the contract price.
- C. Irrigation System Layout Review: Irrigation system layout review will occur after the staking has been completed. Notify the Owners' Representative three business days in advance of review. Modifications will be identified by the Owners' Representative at this review.

3.02 LAYOUT OF WORK

- A. Stake out the irrigation system. Adjust system layout from plans to conform to final approved landscape design. Items staked shall include: Sprinklers, pipe, control valves, manual drains, controller, and isolation valves, grounding locations and sleeving.
- B. Install all mainline pipe and mainline components inside of project property lines.

3.03 EXCAVATION, TRENCHING AND BACKFILLING

- A. Excavate to permit the pipes to be laid at the intended elevations and to permit work space for installing connections and fittings.
- B. Minimum cover (distance from top of pipe or control wire to finish grade):
 - 1. 24-inch over mainline pipe and over electrical conduit.
 - 2. 26-inch over control wire.
 - 3. 26-inch over signal wire.
 - 4. 18-inch over lateral pipe to sprinklers.
 - 5. 8-inch over drip lateral pipe in turf or paved areas downstream of drip system zone control valves.
 - 6. 3-inch minimum mulch cover over drip lateral pipe in planting beds downstream of drip system zone control valves. PVC UV radiation resistant lateral pipe shall be installed

directly on the soil surface under landscape fabric.

- C. Backfill only after lines have been reviewed and passed hydrostatic tests and accepted by the Owner.
 - 1. Excavated material is generally satisfactory for backfill. Backfill shall be free from rubbish, vegetable matter, frozen materials, and stones larger than 1/2-inch in maximum dimension. Remove material not suitable for backfill. Backfill placed next to pipe shall be free of sharp objects which may damage the pipe. All soil shall be screened and pass through a square opening 1/2" x 1/2.
 - 2. Backfill un-sleeved pipe and sleeves in either of the following manners:
 - a. Backfill and puddle the lower half of the trench. Allow to dry 24 hours. Backfill the remainder of the trench in 6-inch layers. Compact to density of surrounding soil.
 - b. Backfill the trench by depositing the backfill material equally on both sides of the pipe in 6-inch layers and compacting to the density of surrounding soil.
 - 3. Enclose pipe and wiring beneath roadways, walks, curbs, etc. in sleeves. Minimum compaction of backfill for sleeves shall be 95% Standard Proctor Density, ASTM D698-78. Conduct one compaction test for each sleeved crossing less than 50 feet long. Conduct two compaction tests for each sleeved crossing greater than 50 feet long. Costs for such testing and any necessary retesting shall be paid for by the Contractor. Use of water for compaction around sleeves, puddling, will not be permitted.
 - 4. Dress backfilled areas to original grade
 - 5. Where utilities conflict with irrigation trenching and pipe work, contact the Owners' Representative for trench depth adjustments.

3.04 SLEEVING AND BORING

- A. Install sleeving at a depth which permits the encased pipe or wiring to remain at the specified burial depth.
- B. Extend sleeve ends six inches beyond the edge of the paved surface. Cover pipe ends and mark with stakes. Mark concrete with a chiseled "X" at sleeve end locations.
- C. Bore for sleeves under obstructions which cannot be removed. Employ equipment and methods designed for horizontal boring.

3.05 ASSEMBLING PIPE AND FITTINGS

- A. General:
 - 1. Keep pipe free from dirt and pipe scale. Cut pipe ends square and deburr. Clean pipe ends.
 - 2. Keep ends of assembled pipe capped to prevent dirt and debris intrusion. Remove caps only when necessary to continue assembly.
- B. Mainline Pipe and Fittings:
 - 1. Use only strap-type friction wrenches for threaded plastic pipe. Tighten threaded plastic pipe per pipe and fitting manufacturers recommendations.
 - 2. PVC Solvent Weld Pipe:

- 1) Use primer and solvent cement. Join pipe in a manner recommended by the manufacturer and in accordance with accepted industry practices.
 - 2) Cure for 30 minutes before handling and 24 hours before allowing water in pipe.
 - 3) Snake pipe from side to side within the trench.
3. Fittings: The use of cross and wye type fittings is not permitted.
- C. Lateral Pipe and Fittings:
1. Use only strap-type friction wrenches for threaded plastic pipe. Tighten threaded plastic pipe per pipe and fitting manufacturers recommendations.
 2. PVC Solvent Weld Pipe:
 - a. Use primer and solvent cement. Join pipe in the manner recommended by the manufacturer and in accordance with accepted industry practices.
 - b. Cure for 30 minutes before handling and 24 hours before allowing water in the pipe.
 - c. Snake pipe from side to side within the trench.
 3. UV Radiation Resistant Polyethylene Pipe:
 - a. Join pipe in the manner recommended by manufacturer and in accordance with accepted industry practices.
 - b. Snake pipe from side to side within the trench, on the soil surface, and hold in place with tubing stakes spaced every five feet.
 4. Fittings: The use of cross and wye type fittings is not permitted.
- D. Specialized Pipe and Fittings:
1. Copper Pipe:
 - a. Buff surfaces to be joined to a bright finish. Coat with solder flux.
 - b. Solder so that a continuous bead shows around the joint circumference.
 2. Galvanized Steel Pipe:
 - a. Join pipe in the manner recommended by manufacturer and in accordance with accepted industry practices.
 - b. Use factory-made threads whenever possible. Field-cut threads will be permitted only where necessary. Cut threads on axis using clean, sharp dies.
 - c. Apply Teflon-type tape or pipe joint compound to the male threads only.
 3. Ductile Iron Pipe:
 - a. Use push-on joints whenever possible. Use pipe lubricant. Join pipe in the manner recommended by manufacturer and in accordance with accepted industry practices.
 4. Insert a dielectric union wherever a copper-based metal (copper, brass, bronze) and an iron-based metal (iron, galvanized steel, stainless steel) are joined.
 5. Pre-fabricated double swing joints: Install per manufacturer's recommendations.
 6. Low Density Polyethylene Hose: Install per manufacturer's recommendations.
 7. PVC Threaded Connections:

- a. Use only factory-formed threads. Field-cut threads are not permitted.
 - b. Use only thread sealant recommended by pipe and fitting manufacturer.
 - c. When connection is plastic-to-metal, the plastic component shall have male threads and the metal component shall have female threads.
8. Make metal-to-metal, threaded connections with Teflon-type tape or pipe joint compound applied to the male threads only.

3.06 INSTALLATION OF MAINLINE COMPONENTS

- A. Main System Shut Off Valve: Install where indicated on the drawings.
- B. Winterization Assembly: Install where indicated on the drawings.
- C. Isolation Gate Valve Assembly:
 1. Install where indicated on the drawings.
- D. Quick Coupling Valve Assembly: Install where indicated on the drawings.

3.07 INSTALLATION OF DRIP IRRIGATION COMPONENTS

- A. Remote Control Valve (RCV) Assembly for Drip Laterals
 1. Flush mainline pipe before installing RCV assembly.
 2. Locate as shown on the drawings. Wire connectors and waterproof sealant shall be used to connect control wires to remote control valve wires. Connectors and sealant shall be installed as per the manufacturer's recommendations.
 3. Install only one RCV to valve box. Locate at least 12-inches from and align with nearby walls or edges of paved areas. Group RCV assemblies together where practical.
 4. Arrange grouped valve boxes in rectangular patterns.
- B. Drip Emitter Assembly:
 1. Locate as shown on the drawings and installation details.
 2. Flush lateral pipe before installing emitter assembly.
 3. Cut emitter outlet distribution tubing square.
 4. Install an access sleeve as part of each multiple-outlet emitter assembly for emitters located in turf areas.
 5. Use tools and techniques recommended by the manufacturer. Make openings for barb-mounted emitters with the emitter manufacturer's hole-punching tool.
- C. Flush Cap Assembly: Install at the end of each drip irrigation lateral pipe as shown on the installation details.

3.08 INSTALLATION OF CONTROL SYSTEM COMPONENTS

- A. Irrigation Controller Unit:
 1. The location of the controller unit as depicted on the drawings is approximate; the Owners'

Representative will determine the exact site location upon commencement of contract during sprinkler layout review.

2. Lightning protection: Ground rods are to have a minimum diameter of 3/4" and a minimum length of 10 feet. These are to be driven into the ground in a vertical position or an oblique angle not to exceed 15 degrees at location 10 feet from the electronic equipment, the ground plate, or the wires and cables connected to said equipment, as shown in the irrigation details. The rod is to be stamped with the UL logo. A 6 AWG solid bare copper wire (no more than 12 feet long) shall be connected to the ground rod by the installer using a Cadweld GR1161G" One-Shot" welding kit. This wire shall be connected to the electronic equipment ground lug as shown in the detail above.
 3. Lightning protection: Provide on all remote-control valve wiring as recommended by the manufacturer. Provide other components such as ground rod, grounding wire, etc., to manufacturer's recommendations.
 4. Install primary surge protection arrestors on incoming power lines.
 5. Install one valve output surge protection arrestor on each control wire and one for the common wire.
 6. Attach wire markers to the ends of control wires inside the controller unit housing. Label wires with the identification number (see drawings) of the remote-control valve to which the control wire is connected.
 7. Connect control wires to the corresponding controller terminal.
- B. Instrumentation:
1. Install sensors per the installation details and manufacturer's recommendations. Install at locations shown on the drawings.
 2. Install electrical connections between irrigation controller and sensors per manufacturer's recommendations.
- C. Control Wire:
1. Bundle control wires where two or more are in the same trench. Bundle with pipe wrapping tape spaced at 10-foot intervals.
 2. Provide a 24-inch excess length of wire in an 8-inch diameter loop at each 90-degree change of direction, at both ends of sleeves, and at 100-foot intervals along continuous runs of wiring. Make wiring loop by turning control wire 5 turns around 1-inch pipe. Coil 24-inch length of wire within each remote-control valve box.
 3. Install common ground wire and one control wire for each remote-control valve. Multiple valves on a single control wire are not permitted.
 4. If a control wire must be spliced, make splice with wire connectors and waterproof sealant, installed per the manufacturer's instructions. Locate splice in a valve box which contains an irrigation valve assembly, or in a separate 6-inch round valve box. Use same procedure for connection to valves as for in-line splices.
 5. Unless noted on plans, install wire parallel with and under PVC mainline pipe. If wire is installed adjacent to section of metal pipe, separate wire from pipe minimum of 6-inches and install wire in PVC conduit.
 6. Encase wire not installed with PVC mainline pipe in electrical conduit.
- D. Warning tape: Detectable Warning Tape shall be installed approximately 6 inches above mainline

pipe where required or where specified.

E. Existing Control Wire:

1. It is assumed that existing 24 VAC control wire, or two-wire path and sensor wire between existing controller and sensors, and between the controllers and solenoid valves is in workable condition. However, Contractor shall field verify the condition and operation of existing control wire or sensor wire prior to construction. Any concerns are to be brought to the attention of the Owner prior to installation of the replacement controller.
2. If existing control wire or sensor wire requires replacement Contractor shall inform Owner of the cost impact and project schedule.

3.09 INSTALLATION OF OTHER COMPONENTS

A. Tools and Spare Parts:

1. Prior to the Pre-Maintenance Review, supply to the Owner operating keys, servicing tools, test equipment, and any other items indicated on the drawings.
2. Prior to Final Review, supply to the Owner the spare parts indicated in the General Notes on the drawings.

B. Other Materials: Install other materials or equipment shown on the drawings or installation details to be part of the irrigation system, even though such items may not have been referenced in these specifications.

3.10 PROJECT RECORD (AS-BUILT) DRAWINGS

- A. Maintain on-site and separate from documents used for construction, one complete set of contract documents as Project Documents. Keep documents current. Do not permanently cover work until as-built information is recorded.
- B. Record pipe and wiring network alterations. Record work which is installed differently than shown on the construction drawings. Record accurate reference dimensions, measured from at least two permanent reference points, of each irrigation system valve, each backflow prevention device, each controller or control unit, each sleeve end, each stub-out for future pipe or wiring connections, and other irrigation components enclosed within a valve box.
- C. Prior to Final Review, purchase from the Owners' Representative a reproducible mylar copy of the drawings. Using technical drafting pen, duplicate information contained on the project drawings maintained on site. Label each sheet "Record Drawing". Completion of the Record Drawings will be a prerequisite for the Final Review.

3.11 MAINTENANCE

- A. Upon completion of Final Review, maintain irrigation system for a duration of 30 calendar days. Make periodic examinations and adjustments to irrigation system components to achieve the most desirable application of water.
- B. Following completion of the Contractor's maintenance period, the Owner will be responsible for maintaining the system in working order during the remainder of the guarantee/warranty period, for performing necessary minor maintenance, for trimming around sprinklers, for protecting against vandalism, and for preventing damage during the landscape maintenance operation.

3.12 CLEAN-UP

- A. Upon completion of work, remove from the site all machinery, tools, excess materials, and rubbish.

END OF SECTION 32 84 00

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Salvage of existing items to be reused or recycled.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.3 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
1. Carefully salvage in a manner to prevent damage and promptly return to Owner.
- C. Materials to be reused remain the property of the Owner.

1.4 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property for dust control. Indicate proposed locations and construction of barriers.
- C. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator, stairs, entrances, and loading docks.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- D. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- E. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before Work begins.
- F. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.6 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.7 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. If available, review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

- E. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
 - 2. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

- F. Survey of Existing Conditions: Record existing conditions by use of measured drawings/preconstruction photographs or video and templates.
 - 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 - 1. Comply with requirements for existing services/systems interruptions specified in Section 011400 "Work Restrictions."

- B. Existing Services/Systems to be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor. Provide minimum 48 hours' notice when requesting shut-off.
 - 2. Arrange to shut off indicated utilities with utility companies.
 - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 4. Disconnect, demolish, and remove systems, equipment, and components indicated to be removed.
 - a. Piping to be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - c. Equipment to be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations, and for duration required by Authorities Having Jurisdiction hours after completion of flame cutting operations and other "hot work" as defined by NFPA 51B.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
8. When cutting concrete, masonry, wallboard and any other dust-producing materials, provide temporary barriers to prevent spread of dust into the rest of the building. Provide filters for mechanical systems and air ducts.
9. Dispose of demolished items and materials promptly.

- B. Removed and Salvaged Items:

1. Clean salvaged items.

2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition[**and cleaned**] and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
 1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.

3.7 SELECTIVE DEMOLITION SCHEDULE

- A. Refer to Drawings.

END OF SECTION

SECTION 031000 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Form-facing material for cast-in-place concrete.
2. Shoring, bracing, and anchoring.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, and reshores in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.

1. Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."
2. Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.
 - a. For architectural concrete specified in Section 033300 "Architectural Concrete," limit deflection of form-facing material, studs, and walers to 0.0025 times their respective clear spans (L/400).

2.2 FORM-FACING MATERIALS

A. As-Cast Surface Form-Facing Material:

1. Provide continuous, true, and smooth concrete surfaces.
2. Furnish in largest practicable sizes to minimize number of joints.
3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete, and as follows:
 - a. Plywood, metal, or other approved panel materials.
 - 1) APA Plyform Class I, B-B or better; mill oiled and edge sealed.

- B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.

1. Provide lumber dressed on at least two edges and one side for tight fit.

2.3 RELATED MATERIALS

- A. Reglets: Fabricate reglets of not less than 0.022-inch-thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- B. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- E. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
 - 2. Form release agent for form liners shall be acceptable to form liner manufacturer.
- F. Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

PART 3 - EXECUTION

3.1 INSTALLATION OF FORMWORK

- A. Comply with ACI 301.
- B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 and to comply with the Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete" for as-cast finishes.
- C. Limit concrete surface irregularities as follows:
 - 1. Surface Finish-1.0: ACI 117 Class D, 1 inch.
- D. Construct forms tight enough to prevent loss of concrete mortar.
 - 1. Minimize joints.
 - 2. Exposed Concrete: Symmetrically align joints in forms.
- E. Construct removable forms for easy removal without hammering or prying against concrete surfaces.
 - 1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
 - 2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 3. Install keyways, reglets, recesses, and other accessories, for easy removal.

- F. Do not use rust-stained, steel, form-facing material.
- G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.
 - 1. Provide and secure units to support screed strips.
 - 2. Use strike-off templates or compacting-type screeds.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.
 - 1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
 - 2. Locate temporary openings in forms at inconspicuous locations.
- I. Chamfer exterior corners and edges of permanently exposed concrete.
- J. At construction joints, overlap forms onto previously placed concrete not less than 12 inches.
- K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.
 - 1. Determine sizes and locations from trades providing such items.
 - 2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.
- L. Construction and Movement Joints:
 - 1. Construct joints true to line with faces perpendicular to surface plane of concrete.
 - 2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 3. Place joints perpendicular to main reinforcement.
- M. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- N. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- O. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.
 - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
3. Clean embedded items immediately prior to concrete placement.

3.3 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
 1. Inspect formwork for shape, location, and dimensions of the concrete member being formed.

END OF SECTION 031000

SECTION 032000 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Steel reinforcement bars.
 2. Welded-wire reinforcement.

1.2 ACTION SUBMITTALS

- A. Shop Drawings: Comply with ACI SP-066:
1. Include placing drawings that detail fabrication, bending, and placement.
 2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.

2.2 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
- B. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch in diameter.

2.3 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protection of In-Place Conditions:
 - 1. Do not cut or puncture vapor retarder.
 - 2. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
- B. Accurately position, support, and secure reinforcement against displacement.
 - 1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
 - 2. Do not tack weld crossing reinforcing bars.
- C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- D. Provide concrete coverage in accordance with ACI 318.
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings.
 - 1. Bars indicated to be continuous, and all vertical bars to be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.
 - 2. Stagger splices in accordance with ACI 318.
- G. Install welded-wire reinforcement in longest practicable lengths.
 - 1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."
 - a. For reinforcement less than W4.0 or D4.0, continuous support spacing to not exceed 12 inches.
 - 2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
 - 3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.

4. Lace overlaps with wire.

3.3 JOINTS

- A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 1. Place joints perpendicular to main reinforcement.
 2. Continue reinforcement across construction joints unless otherwise indicated.
 3. Do not continue reinforcement through sides of strip placements of floors and slabs.

3.4 INSTALLATION TOLERANCES

- A. Comply with ACI 117.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
 1. Steel-reinforcement placement.

END OF SECTION 032000

SECTION 03300 – CAST-IN-PLACE CONCRETE (Civil/ Landscape)

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.
- B. Standard Specifications for Public Works Construction, 2012 Edition, as adopted by Washoe County.
- C. Geotechnical Investigation Report, “Geotechnical Investigation Sparks Forecourt, Sparks, Nevada”, prepared by Black Eagle Consulting, Inc., April 8, 2022.

1.2 SUMMARY

- A. The project requirements for site concrete shall be those specified in Sections 311 - Concrete Structures and Masonry Construction and 312 - Concrete Curb, Gutters, Walks, Driveways, and Alley Returns of the Standard Specifications for Public Works Construction, Latest Edition, the requirements stated herein and the requirements shown on the contract documents.

PART 2 - PRODUCTS

2.1 Materials

- A. Portland Cement Concrete (P.C.C.) shall have the following characteristics: 4000 PSI min compressive strength at 28 days with min. of 6.25 sacks of cement per cubic yard of concrete. Air entertainment shall be 4-7%, slump shall range from 1” min. to 4” max. All materials shall conform to SSPWC Sec. 202. All site concrete shall be reinforced with collated, fibrillated, polypropylene fibers as manufactured by Fibermesh or approved equal. Use 1 1/2 lbs. per cubic yard.
- B. The Contractor shall submit all products for approval by the Architect at least 14 days prior to the proposed installation date.

PART 3 - EXECUTION

3.1 REQUIREMENTS

- A. The project requirements of Sections 311 - Concrete Structures and Masonry Construction and 312 - Concrete Curb, Gutters, Walks, Driveways, and Alley Returns of the Standard Specifications for Public Works Construction, Latest Edition.

END OF SECTION 321300

SECTION 033000 - CAST-IN-PLACE CONCRETE (STRUCTURAL)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, and other pozzolans materials subject to compliance with requirements.

- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.3 ACTION SUBMITTALS

A. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
10. Intended placement method.
11. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

B. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.

3. Exposure Class designation.
4. Curing process.

1.4 QUALITY ASSURANCE

- A. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1.5 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.
 1. Include the following information in each test report:
 - a. Admixture dosage rates.
 - b. Slump.
 - c. Air content.
 - d. Seven-day compressive strength.
 - e. 28-day compressive strength.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301.

1.7 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1.
- B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

- A. Cementitious Materials:
 1. Portland Cement: ASTM C150/C150M, Type I/II.
 2. Fly Ash: ASTM C618, Class C or F.

3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C33/C33M, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source.
 1. Alkali-Silica Reaction: Comply with one of the following:
 - a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
 - b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
 - c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.
 2. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
- C. Air-Entraining Admixture: ASTM C260/C260M.
- D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.
 1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
 2. Retarding Admixture: ASTM C494/C494M, Type B.
 3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
 5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
- E. Water and Water Used to Make Ice: ASTM C94/C94M, potable or complying with ASTM C1602/C1602M, including all limits listed in Table 2 and the requirements of paragraph 5.4

2.3 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
 1. Color:
 - a. Ambient Temperature Below 50 deg F: Black.
 - b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
 - c. Ambient Temperature Above 85 deg F: White.

- C. Curing Paper: 8-foot-wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.
- D. Water: Potable or complying with ASTM C1602/C1602M.
- E. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.
- F. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.

2.4 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.
 - 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash or Other Pozzolans: 25 percent by mass.
 - 2. Slag Cement: 50 percent by mass.
 - 3. Total of Fly Ash or Other Pozzolans, Slag Cement: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass.
 - 4. Total of Fly Ash or Other Pozzolans: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
 - 1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, and concrete with a w/cm below 0.50.

2.5 CONCRETE MIXTURES

- A. Class A: Normal-weight concrete used for footings, grade beams, and tie beams.
 - 1. Exposure Class: ACI 318 F2.
 - 2. Minimum Compressive Strength: 4500 psi at 28 days.
 - 3. Maximum w/cm: 0.45.
 - 4. Air Content:
 - a. Exposure Classes F2 and F3: 6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size.

2.6 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M, and furnish batch ticket information.

PART 3 - EXECUTION

3.1 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.
 - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.

3.2 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
 - 1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
 - 2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
 - 1. If a section cannot be placed continuously, provide construction joints as indicated.
 - 2. Deposit concrete to avoid segregation.
 - 3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
 - a. Do not use vibrators to transport concrete inside forms.

- b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
 - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
 - d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Do not place concrete floors and slabs in a checkerboard sequence.
 2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 3. Maintain reinforcement in position on chairs during concrete placement.
 4. Screed slab surfaces with a straightedge and strike off to correct elevations.
 5. Level concrete, cut high areas, and fill low areas.
 6. Slope surfaces uniformly to drains where required.
 7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
 8. Do not further disturb slab surfaces before starting finishing operations.

3.3 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
 - a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
 - b. Remove projections larger than 1 inch.
 - c. Tie holes do not require patching.
 - d. Surface Tolerance: ACI 117 Class D.
 - e. Apply to concrete surfaces not exposed to public view.

3.4 CONCRETE CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
 2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
 3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h, calculated in accordance with ACI 305.1, before and during finishing operations.

3.5 TOLERANCES

- A. Conform to ACI 117.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
1. Testing agency to be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
 2. Testing agency to immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
 3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
 - a. Test reports to include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
 - 1) Project name.
 - 2) Name of testing agency.
 - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
 - 4) Name of concrete manufacturer.
 - 5) Date and time of inspection, sampling, and field testing.
 - 6) Date and time of concrete placement.
 - 7) Location in Work of concrete represented by samples.
 - 8) Date and time sample was obtained.
 - 9) Truck and batch ticket numbers.
 - 10) Design compressive strength at 28 days.
 - 11) Concrete mixture designation, proportions, and materials.
 - 12) Field test results.
 - 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
 - 14) Type of fracture and compressive break strengths at seven days and 28 days.
- B. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.
- C. Inspections:
1. Headed bolts and studs.
 2. Verification of use of required design mixture.
 3. Concrete placement, including conveying and depositing.
 4. Curing procedures and maintenance of curing temperature.
 5. Verification of concrete strength before removal of shores and forms from beams and slabs.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C143/C143M:
 - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - b. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete;
 - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064/C1064M:
 - a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C31/C31M:
 - a. Cast and laboratory cure two sets of two 6-inch by 12-inch or 4-inch by 8-inch cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C39/C39M.
 - a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.
7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
8. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
9. Additional Tests:
 - a. Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
 - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.

- 1) Acceptance criteria for concrete strength to be in accordance with ACI 301, Section 1.6.6.3.
10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 033000

SECTION 034500 - PRECAST ARCHITECTURAL CONCRETE

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. Precast seat wall
- B. Related Requirements:
 - 1. Section 033000 "Cast-in-Place Concrete" for foundations and for installing connection anchors in concrete.

1.3 ALLOWANCES

- A. Source quality-control and field quality-control testing are part of testing and inspecting allowance.

1.4 DEFINITIONS

- A. Design Reference Sample: Sample of approved Architectural precast concrete color, finish and texture, preapproved by owner's representative.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.
- C. Shop Drawings:
 - 1. Detail fabrication and installation of Architectural precast concrete units.
 - 2. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit.

3. Indicate joints, reveals, drips, chamfers, and extent and location of each surface finish.
 4. Indicate type, size, and length of welded connections by AWS standard symbols. Detail loose and cast-in hardware and connections.
 5. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
 6. Include plans and elevations showing unit location and sequence of installation for special conditions.
 7. Indicate location of each Architectural precast concrete unit by same identification mark placed on unit.
 8. Indicate relationship of Architectural precast concrete units to adjacent materials.
 9. If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.
- D. Samples: Design reference samples for initial verification of design intent, for each type of finish indicated on exposed surfaces of Architectural precast concrete units representative of finish, color, and texture variations expected

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Welding certificates.
- C. Material Certificates: For the following items:
 1. Cementitious materials.
 2. Reinforcing materials and prestressing tendons.
 3. Admixtures.
 4. Structural-steel shapes and hollow structural sections.
 5. Insulation.
- D. Material Test Reports: For aggregates.
- E. Preconstruction test reports.
- F. Source quality-control test reports.
- G. Field quality-control reports.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A precast concrete erector with at least 5 years of demonstrable experience in the installation of architectural precast units.
- B. Fabricator Qualifications: A firm that assumes responsibility for engineering Architectural precast concrete units to comply with performance requirements. This responsibility includes

preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 for testing indicated.
- D. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."
- E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D.1.1M, "Structural Welding Code - Steel"; and AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."
- F. Sample unit: After sample approval and before fabricating Architectural precast concrete units, produce a minimum of two sample units approximately in area for review by Owner's representative. Incorporate full-scale details of Architectural features, finishes, textures, and transitions in sample units.
 - 1. Locate units where indicated or, if not indicated, as directed by Owner's representative.
 - 2. Damage part of an exposed-face surface for each finish, color, and texture, and demonstrate adequacy of repair techniques proposed for repair of surface blemishes.
 - 3. After acceptance of repair technique, maintain one sample unit at manufacturer's plant and one at Project site in an undisturbed condition as a standard for judging the completed Work.
 - 4. Demolish and remove sample units when directed.
- G. Mockups: After sample unit approval but before production of Architectural precast concrete units, construct full-sized mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Build mockup as indicated on Drawings of Architectural precast concrete complete with anchors, connections, flashings, and joint fillers.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner's representative specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.

1.9 COORDINATION

- A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver Architectural precast concrete units in such quantities and at such times to limit unloading units temporarily on the ground or other rehandling.
- B. Support units during shipment on nonstaining shock-absorbing material.
- C. Store units with adequate dunnage and bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.
- D. Place stored units so identification marks are clearly visible, and units can be inspected.
- E. Handle and transport units in a manner that avoids excessive stresses that cause cracking or damage.
- F. Lift and support units only at designated points indicated on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. QCP
731 Parkridge Ave. Norco, California 92860 United States
[Concrete Architectural Amenities & Furniture | QCP Concrete Solutions \(qcp-corp.com\)](http://Concrete Architectural Amenities & Furniture | QCP Concrete Solutions (qcp-corp.com))
Product representative: Anthony Vargas
Phone: (951)232-0979
Approved Equal

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design Architectural precast concrete units.
- B. Design Standards: Comply with ACI 318 and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of Architectural precast concrete units indicated.

2.3 MOLD MATERIALS

- A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that provides continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.
 - 1. Mold-Release Agent: Commercially produced form-release agent that does not bond with, stain or adversely affect precast concrete surfaces and does not impair subsequent surface or joint treatments of precast concrete.

- B. Surface Retarder: Chemical set retarder, capable of temporarily delaying final hardening of newly placed concrete mixture to depth of reveal specified.

2.4 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A615/A615M, deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A706/A706M, deformed.
- C. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117.

2.5 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or Type III, gray, unless otherwise indicated.
 - 1. For surfaces exposed to view in finished structure, use gray or white cement, of same type, brand, and mill source.
- B. Supplementary Cementitious Materials:
 - 1. Fly Ash: ASTM C618, Class C or F, with maximum loss on ignition of 3 percent.
 - 2. Metakaolin: ASTM C618, Class N.
 - 3. Silica Fume: ASTM C1240, with optional chemical and physical requirement.
 - 4. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120.
- C. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C33/C33M, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
 - 1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.
 - a. Gradation: To match design reference sample.
 - 2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand compatible with coarse aggregate; to match approved finish sample.
- D. Lightweight Aggregates: Except as modified by PCI MNL 117, ASTM C330/C330M, with absorption less than 11 percent.
- E. Coloring Admixture: ASTM C979/C979M, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading.
- F. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.
- G. Air-Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other required admixtures.

- H. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.
 - 1. Water-Reducing Admixtures: ASTM C494/C494M, Type A.
 - 2. Retarding Admixture: ASTM C494/C494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
 - 4. Water-Reducing and Accelerating Admixture: ASTM C494/C494M, Type E.
 - 5. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
 - 6. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
 - 7. Plasticizing Admixture: ASTM C1017/C1017M, Type I.
 - 8. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
 - 9. Corrosion Inhibiting Admixture: ASTM C1582/C1582M.

2.6 GROUT MATERIALS

- A. Sand-Cement Grout: Portland cement, ASTM C150/C150M, Type I, and clean, natural sand, ASTM C144 or ASTM C404. Mix at ratio of 1 part cement to 2-1/2 to 3 parts sand, by volume, with minimum water required for placement and hydration. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C1218/C1218M.
- B. Nonmetallic, Nonshrink Grout: Packaged, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C1107/C1107M, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C1218/C1218M.
- C. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C881/C881M, of type, grade, and class to suit requirements.

2.7 CONCRETE MIXTURES

- A. Prepare design mixtures for each type of precast concrete required.
 - 1. Use a single design mixture for units with more than one major face or edge exposed.
 - 2. Where only one face of unit is exposed use either a single design mixture or separate mixtures for face and backup.
- B. Limit use of fly ash and ground granulated blast-furnace slag to 20 percent of portland cement by weight; limit metakaolin and silica fume to 10 percent of portland cement by weight.
- C. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at Architectural precast concrete fabricator's option.
- D. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 or PCI MNL 117 when tested according to ASTM C1218/C1218M.

- E. Normal-Weight Concrete Mixtures: Proportion face and backup mixtures or full-depth mixtures, at fabricator's option by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 5000 psi minimum.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
- F. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to ASTM C642, except for boiling requirement.
- G. Lightweight Concrete Backup Mixtures: Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 211.2, with materials to be used on Project, to provide lightweight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 5000 psi.
 - 2. Unit Weight: Calculated equilibrium unit weight of 115 lb/cu. Ft., plus or minus 3 lb/cu. ft., according to ASTM C567.
- H. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.
- I. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

2.8 MOLD FABRICATION

- A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.
- B. Maintain molds to provide completed Architectural precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.
 - 1. Form joints are not permitted on faces exposed to view in the finished work.
 - 2. Edge and Corner Treatment: Uniformly radiused.

2.9 FABRICATION

- A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
 - 1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."

- B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing Architectural precast concrete units to supporting and adjacent construction.
- C. Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.
 - 1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcing exceeds limits specified in ASTM A775/A775M, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
 - 2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
 - 3. Place reinforcing steel to maintain at least 3/4-inch minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
 - 4. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.
- D. Reinforce Architectural precast concrete units to resist handling, transportation, and installation stresses and specified in-place loads.
- E. Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
- F. Place face mixture to a minimum thickness after consolidation of the greater of 1 inch or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.
- G. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.
 - 1. Place backup concrete mixture to ensure bond with face-mixture concrete.
- H. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 117.
 - 1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants." Ensure adequate bond between face and backup concrete, if used.
- I. Comply with PCI MNL 117 for hot- and cold-weather concrete placement.
- J. Identify pickup points of Architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or

permanently mark casting date on each Architectural precast concrete unit on a surface that does not show in finished structure.

- K. Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.
- L. Discard and replace Architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Owner's representative's approval.

2.10 FABRICATION TOLERANCES

- A. Fabricate Architectural precast concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.
- B. Fabricate Architectural precast concrete units to shapes, lines, and dimensions indicated so each finished unit complies with the following product tolerance of 1/8" in all dimensions.
- C. Position Tolerances: For cast-in items measured from datum line location, as indicated on Shop Drawings.
 - 1. Reinforcing Steel: Plus or minus 1/4 inch where position has structural implications or affects concrete cover; otherwise, plus or minus 1/2 inch.

2.11 FINISHES

- A. Exposed faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight, and sharp. Finish exposed-face surfaces of Architectural precast concrete units to match approved design reference sample and as follows:
 - 1. Design Reference Sample:
 - a. Precast concrete finish #1: as-cast finish to match approved sample for acceptable surface, air voids, sand streaks, and honeycomb
 - 2. Precast concrete finish #2: exposed aggregate finish using chemical retarding agents applied to concrete forms and washing and brushing procedures to expose aggregate and surrounding matrix surfaces after form removal.

2.12 SOURCE QUALITY CONTROL

- A. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 117 requirements. If using self-consolidating concrete, also test and inspect according to PCI TR-6, ASTM C1610/C1610M, ASTM C1611/C1611M, ASTM C1621/C1621M, and ASTM C1712.
- B. Owner will employ an independent testing agency to evaluate Architectural precast concrete fabricator's quality-control and testing methods.

1. Allow Owner's testing agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with Owner's testing agency and provide samples of materials and concrete mixtures as may be requested for additional testing and evaluation.
- C. Strength of precast concrete units is considered deficient if units fail to comply with ACI 318 requirements for concrete strength.
- D. Testing: If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 requirements, precaster will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C42/C42M and ACI 318.
1. A minimum of three representative cores shall be taken from units of suspect strength, from locations directed by Owner's representative.
 2. Test cores in an air-dry condition.
 3. Strength of concrete for each series of three cores is considered satisfactory if average compressive strength is equal to at least 85 percent of 28-day design compressive strength and no single core is less than 75 percent of 28-day design compressive strength.
 4. Report test results in writing on same day that tests are performed, with copies to Owner's representative, Contractor, and precast concrete fabricator. Test reports include the following:
 - a. Project identification name and number.
 - b. Date when tests were performed.
 - c. Name of precast concrete fabricator.
 - d. Name of concrete testing agency.
 - e. Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.
- E. Patching: If core test results are satisfactory and precast concrete units comply with requirements, clean and dampen core holes and solidly fill with precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.
- F. Defective Units: Discard and replace recast Architectural concrete units that do not comply with acceptability requirements in PCI MNL 117, including concrete strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Owner's representative's approval. Owner's representative reserves the right to reject precast units that do not match approved samples, sample units, and mockups. Replace unacceptable units with precast concrete units that comply with requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, bearing surface tolerances, and other conditions affecting performance of the Work.
- B. Do not install precast concrete units until supporting cast-in-place concrete has attained minimum allowable design compressive strength and supporting steel or other structure is structurally ready to receive loads from precast concrete units.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install clips, hangers, bearing pads, and other accessories required for connecting Architectural precast concrete units to supporting members.
- B. Install Architectural precast concrete level, plumb, and square within specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.
 - 1. Install temporary steel or plastic leveling shims as precast concrete units are being installed.
 - 2. Maintain horizontal and vertical joint alignment and uniform joint width as installation progresses.
 - 3. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
 - 4. Unless otherwise indicated, maintain uniform joint widths of 1/8 inch.
- C. Connect Architectural precast concrete units in position on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
- D. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.
 - 1. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot.
 - 2. For slip-critical connections, use one of the following methods to assure proper bolt pretension:
 - a. Turn-of-Nut: According to RCSC's "Specification for Structural Joints Using ASTM A325 or A 490 Bolts."
 - b. Calibrated Wrench: According to RCSC's "Specification for Structural Joints Using ASTM A325 or A 490 Bolts."
 - c. Twist-off Tension Control Bolt: ASTM F3125/F3125M, Grade 1852.
 - d. Direct-Tension Control Bolt: ASTM F3125/F3125M, Grade 1852.

3. For slip-critical connections, use method and inspection procedure approved by Owner's representative and coordinated with inspection agency.
- E. Grouting or Dry-Packing Connections and Joints: Grout connections where required or indicated. Retain flowable grout in place until hard enough to support itself. Alternatively, pack spaces with stiff dry-pack grout material, tamping until voids are completely filled. Place grout and finish smooth, level, and plumb with adjacent concrete surfaces. Promptly remove grout material from exposed surfaces before it affects finishes or hardens. Keep grouted joints damp for not less than 24 hours after initial set.

3.3 INSTALLATION TOLERANCES

- A. Erect Architectural precast concrete units level, plumb, square, and in alignment, without exceeding the following noncumulative installation tolerances:
 1. Plan Location from survey Benchmark: Plus or minus 1/2 inch.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections and prepare reports:
 1. Installation of precast concrete members.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.
- C. Testing agency will report test results promptly and in writing to Contractor and Owner's representative.
- D. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, shall be performed to determine compliance of replaced or additional work with specified requirements.

3.5 REPAIRS

- A. Repair Architectural precast concrete units if permitted by Owner's representative. Owner's representative reserves the right to reject repaired units that do not comply with requirements.
- B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 5 feet.
- C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A780/A780M.

- D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.
- E. Remove and replace damaged Architectural precast concrete units when repairs do not comply with requirements.

3.6 CLEANING

- A. Clean surfaces of precast concrete units exposed to view.
- B. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.
- C. Clean exposed surfaces of precast concrete units after installation and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
 - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Protect other work from staining or damage due to cleaning operations.
 - 2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 034500

SECTION 034900 - GLASS-FIBER-REINFORCED CONCRETE (GFRC)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes plant-precaster glass-fiber-reinforced concrete panels, including embedded hardware, loose connection hardware, and integrated panel framing.

1.2 ACTION SUBMITTALS

- A. Product Data: Submit, prior to the submission of shop drawings, copies of product data for each proprietary material specified. Submit mill test reports.
- B. Design Mixes: Submit, prior to casting operations, design mix data.
- C. Shop Drawings: Submit shop drawings indicating the following:
 - 1. Content:
 - a. Unit shapes (elevations and sections), and dimensions.
 - b. Thickness of facing and GFRC backing.
 - c. Finishes; also include materials used for form release agent.
 - d. Joint, and connection details. Indicate welded connections by AWS standard symbols. Indicate the method of field adjustment for all proposed connections.
 - e. Lifting and erection inserts.
 - f. Cold-formed metal framing layout and details, location and details of connection hardware attached to structure; size, location, and details of flex, gravity, and seismic anchors; and description of loose, cast-in, and field hardware.
 - g. Location, dimensional tolerances, and details of anchorage devices that are embedded in or attached to structure or other construction.
 - h. Other items cast into panels.
 - i. Handling procedures, plans and/or elevations showing panel location, and sequence of erection.
 - j. Show location of each GFRC unit by same identification mark placed on panel.
 - k. Relationship of GFRC panels to adjacent materials.
 - 2. Loads: Show the location, type, magnitude and direction of all loads from the exterior cladding system to the building structural frame. Show each panel, each level, for each facade of the building. Coordinate the location, type, magnitude, and direction of all imposed loadings from the GFRC cladding system to the base building structural frame with the Structural Engineer.

- D. Samples: Match samples on file in the Architect's office. Submit one set of three samples, each sample 12 by 12 inches by full thickness (300 by 300 mm by full thickness), for each panel type indicated and each finish required. Submit samples prior to fabrication of GFRC units and construction of mockup, using same design mix as proposed for the finished work. Sample acceptance will be for color, appearance and configuration of aggregate, aggregate distribution and depth of exposure only. Compliance with other requirements is the responsibility of the Contractor.

1.3 INFORMATIONAL SUBMITTALS

- A. Welding Certificates: Submit copies of welding certification for each welder.
- B. Qualification Data: Submit qualification data for firm(s) specified in "Quality Assurance" Article.
- C. Test Reports: Submit copies of all testing and inspection reports required within this Specification Section which shall have been performed in accordance with PCI MNL-128, and MNL-130 and which includes, but is not limited to, the following:
 - 1. Mill Certificates and Test Reports: Submit mill certificates or test reports from a qualified independent testing agency indicating steel sheet for panel framing complies with requirements.
 - 2. Glass content by "wash-out" test.
 - 3. Flexural yield strength.
 - 4. Flexural ultimate strength.
 - 5. Flex anchor/gravity anchor strength.
 - 6. Slurry unit weight test.
 - 7. Slurry slump test.
 - 8. Aggregate gradation testing.
- D. Design Calculations: Prior to forming operations, submit for review and comment only, structural design calculations for the fabrication, and erection of all GFRC work. All shop drawings and supporting calculations prepared and submitted herein shall bear the seal and signature of a licensed Professional Engineer registered in the State where the GFRC is to be erected and who is experienced in the design of GFRC panel products.

1.4 QUALITY ASSURANCE

- A. Qualifications: A firm having a minimum of 5 years successful experience performing custom fabrication and erection of GFRC panel work comparable to that shown and specified, in not less than three projects of similar scope to the satisfaction of the Architect, and maintains an organized quality control and testing program, and who retains facilities with sufficient capacity and quality to produce the required units without causing delay to the project.

1. GFRC panel engineering, including support and connection to building structural framing, shall be performed and sealed by a licensed Professional Engineer registered in the State where the GFRC is to be erected and who is experienced in the design of GFRC panel products.
 - a. Where loading from GFRC panels transmits forces to the building structural frame which exceed the capacity of the frame to resist such forces, the GFRC contractor shall engineer, provide, and install all supplemental steel supports and bracing required to stiffen the frame. Architect shall approve loads imposed on structure. The GFRC engineer shall coordinate through the structural engineer the location, type, magnitude, and direction of all imposed loadings from the exterior GFRC cladding system to the base building structural frame.
 2. The connection systems, where indicated, are suggested for the GFRC installation. The final design of all connection systems shall be the sole responsibility of the GFRC subcontractor and thereafter the Contractor for acceptance and inclusion into the Project.
 - a. The GFRC panels shall have a minimum of two gravity connections. Design gravity connections to have lateral relief to allow for thermal movements in the plane of the GFRC panel. Gravity connections may also act as lateral connections.
 - b. Except where a gravity connection is also a lateral connection, lateral connections shall not carry gravity loads. Design lateral connections to provide lateral relief to allow for thermal movements in the plane of the GFRC panel.
 - c. In general, connections shall not offer restraint to loads and deformations except for which specifically designed.
 - d. Use property data generated from manufacturer's actual production.
 3. Participates in PCI's Plant Certification Program and is designated a PCI-Certified Plant for Group G, Glass Fiber Reinforced Concrete. A manufacturer known to be capable of complying with the requirements includes the following:
 - a. Basis of Design Manufacturer: GFRC Cladding Systems, LLC, 118 N. Shiloh Road, Garland, Texas.
- B. Mill certificates or test reports from a qualified independent testing agency indicating steel sheet for panel framing complies with requirements.
- C. Standards: Except as modified by governing codes and by the Contract Documents, comply with the applicable provisions and recommendations of the following. This specification governs in case of conflicting requirements. Manufacturing, quality control and inspection procedures are to comply with applicable sections of PCI MNL-128 and PCI MNL 130.
1. American Welding Society (AWS):

- a. A5.1 "Specifications for Carbon Steel Electrodes for Shielded Metal Arc Welding."
 - b. A5.4 "Specifications for Stainless Steel Electrodes for Shielded Metal Arc Welding."
 - c. A5.18 "Specifications for Carbon Steel Filler Metals for Gas Shielded Arc Welding."
 - d. B2.1 "Standard for Welding Procedure and Performance Qualification."
 - e. D1.1 "Structural Welding Code - Steel."
 - f. D1.3 "Structural Welding Code - Sheet Steel."
2. Precast/Prestressed Concrete Institute (PCI):
 - a. PCI MNL 128, "Recommended Practice for Glass Fiber Reinforced Concrete Panels, latest edition."
 - b. PCI MNL 130, "Manual for Quality Control for Plants and Production of Glass Fiber Reinforced Concrete Products, latest edition."
 3. Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" for calculating structural characteristics of cold-formed metal framing.
 4. American Institute of Steel Construction (AISC):
 - a. Specifications for Structural Steel Buildings - Allowable Stress Design and Plastic Design, Latest Edition.
 - b. Specifications for Structural Steel Buildings - Load and Resistance Factor Design Specification for Structural Steel Buildings, Latest Edition.
- D. Testing:
1. Owner Testing: The Owner may engage an independent testing and inspection agency acceptable to the Architect to verify the adequacy of the GFRC quality control. The testing agency shall perform a part time program for the testing and inspection of the GFRC work, evaluate the results for compliance with the Specifications, and report the findings to the Owner, Architect, Contractor. If engaged, refer to Section 014000 "Quality Control," for additional responsibilities and qualifications of the Owner's independent testing and inspection agency.
 2. The GFRC contractor shall engage a qualified testing and inspection agency, which shall be other than that retained by the Owner for the purpose of designing the GFRC mixes and determining the suitability of materials to be used in the Work. The extent of the GFRC contractor testing for mixes and materials suitability is specified under Article "Contractor Testing." The GFRC contractor shall furnish all materials samples, shop drawings, and access to materials as required for testing and any casual labor and facility required by the Owner's independent testing and inspection agency to aid in its quality control verification testing.
- E. Welder Qualifications: Qualify procedures and personnel according to AWS standards.

1. Certify that each welder has satisfactorily passed AWS qualification tests, within the past year, for welding processes involved and, if pertinent, has undergone recertification.
- F. Visual Mock-up: Build a minimum of three (3) approximately 48 inch by 48 inch x full thickness mock-up panels at the GFRC manufacturer's facility. Fabricate and erect visual mock-up after acceptance of samples but before project panel production. Build mock-ups to verify selections made under sample submittals, to demonstrate aesthetic effects, to set quality standards for materials, fabrication, and as a standard for judging acceptability of GFRC Work. Replace unsatisfactory work as directed by Owner.
- G. Sample Installations: Provide sample installations to the extent shown, or, if not shown, as directed by the Architect. Sample installations shall be built on-site complete with all anchors, connections, as accepted on the final shop drawings. Sample installations will be used as a standard for judging acceptability of work for the Project. Replace unsatisfactory work as directed. Maintain sample installations during construction as a standard for judging acceptability of GFRC work. Properly finished and maintained sample installations may be retained as a portion of the completed work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling:

1. Deliver all GFRC units to the project site in such quantities and at such times to assure compliance with the schedule and proper setting sequence.
2. Handle and transport units in a position consistent with their shape and design in order to avoid stresses which would cause cracking or damage.
3. Lift or support units only at points shown on the shop drawings.
4. Place non-staining resilient spacers of even thickness between each unit.
5. Support units during shipment on non-staining shock absorbing material.
6. Do not place units directly on ground.

B. Storage at Jobsite:

1. Store and protect units to prevent contact with soil, staining, and physical damage.
2. Store units, unless otherwise specified, with non-staining, resilient supports located in same positions as when transported.
3. Store units on firm, level, and smooth surfaces to prevent cracking, distortion, warping or other physical damage.
4. Place stored units so that identification marks are discernible, and so that product can be inspected.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide GFRC panels and panel frames capable of withstanding gravity, wind, seismic, and erection design loads as well as the effects of thermal- and moisture-induced volume changes, according to load factors and combinations established in PCI MNL 128, "Recommended Practice for Glass Fiber Reinforced Concrete Panel."
1. Design Wind Loads: The GFRC panels shall be designed, fabricated, and installed to withstand the maximum inward and outward wind pressures as indicated on the structural drawings for components and cladding.
 2. Seismic Loads: Refer to the structural drawings.
 - a. Provide miscellaneous steel framing not shown on Drawings which is required to satisfy seismic criteria.
 3. Design framing systems to withstand design loads with lateral deflections no greater than 1/240 of the wall height.
- B. Thermal Movement: Design, fabricate, and install GFRC assemblies to withstand expansion and contraction forces resulting from material surface temperature range of +20 deg. F. to 150 deg. F C).
1. Dimensions shown on Drawings are based on an assumed design temperature of +70 deg F (+21 deg C). Fabrication and erection procedures shall take into account the material surface temperature range at the time of panel erection.
- C. Deflections: Base calculations for deflections upon all loads superimposed on the panels (including windows, curtain walls and other adjacent materials if applicable), building structural frame movements, erection tolerances, thermal stresses, and the following.
1. Design framing systems to withstand design loads with lateral deflections no greater than 1/240 of the wall height.
- D. Building Movement: Design, fabricate, and install GFRC panels to withstand building movements including thermal movements, loading deflections, shrinkage, creep and similar movements. Thermal movements shall be as specified herein. Building frame deflections, shrinkage, creep and other movements are available from the structural engineer.
- E. Design Modifications:
1. Submit design modifications necessary to meet the performance requirements and field coordination.
 2. Variations in details or materials shall not adversely affect the appearance, durability or strength of units.

3. Maintain the general design concept without altering size of members, profiles and alignment.

2.2 GFRC MATERIALS

- A. Portland Cement: Use same brand(s), type(s), mill source(s) of supply throughout the Work and complying with the following:
 1. ASTM C 150, Type I white, non-staining, and meeting requirements of ASTM C 150.
- B. Glass Fibers: Alkali resistant, with a minimum zirconia content of 16 percent, 1 to 2 inches (25 to 50 mm) long, specifically produced for use in GFRC.
- C. Aggregates: Provide, and stockpile, fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for the entire Project. Aggregates shall be clean, hard, strong, durable, and inert, free of staining and deleterious materials. Aggregate gradation shall be as required to suit performance requirements and to match the Architect's accepted sample and complying with the following:
 1. Sand (Fine Aggregate): Washed and dried fine silica, successfully used in GFRC production, able to pass a no. 16 sieve, complying with composition requirements in ASTM C 144.
 2. Aggregate: Clean, hard, strong, durable, inert and free of deleterious material, conforming to ASTM C 33 except for gradation. Size to be less than 12 mm diameter.
- D. Coloring Admixture: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures, temperature stable, nonfading, and alkali resistant. Organic pigments shall not be permitted.
- E. Water: Fresh, clean, potable and free of any deleterious matter that would interfere with color, setting or strength of concrete, and complying with the chemical limits of PCI MNL 130..
- F. Polymer Curing Admixture: Acrylic thermoplastic copolymer dispersion conforming to PCI MNL-128 and Appendix E of PCI MNL-130.
- G. Admixture: Conforming to ASTM C 494 for chemical admixtures, and ASTM C 618 for fly ash or natural pozzolan admixtures. Do not use admixtures that contain more than 0.1% chloride ions.
- H. Air-Entraining Admixture: ASTM C 260.

2.3 ANCHORS AND SUBSYSTEMS

- A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M, except tube shapes.

- B. Carbon-Steel Rods and Headed Stud Embed Anchors: ASTM A 108, AISI 1018, cold drawn, welded per TWR Nelson method.
- C. Carbon-Steel Plate: ASTM A 283/A 283M.
- D. Bolts: ASTM A 307 or ASTM F 3125.
- E. Flex Anchors: 3/8 inch or 1/4 inch diameter bent rod - ASTM A 36.
- F. Structural Tubing: Shall be formed from steel conforming to ASTM A 500.
- G. Reinforcing (deformed) Bars: ASTM A 706 deformed billet steel bars, grade 60. Galvanized rebar to ASTM 767, class II, grade 40.
- H. Finish: Zinc coated by hot-dip process according to ASTM A 123/A 123M and ASTM A 153/A 153M, as applicable.

2.4 PANEL FRAME

- A. General: Steel frame system shall be a welded prefabricated frame produced in accordance with approved shop drawings, fabricated to meet performance requirements, handling and erection loads.
- B. Panel Frame Materials: Conforming to ASTM A 653/A 653M, structural-steel sheet, [G90 (Z275)] zinc coating, cold formed into manufacturer's standard C-shaped steel studs with stiffened flanges for panel frames, complying with ASTM C 955, minimum uncoated steel thickness of 0.0538 inch (1.37 mm) for the panel framing members
- C. Panel Frame: Fabricate panel framing and accessories plumb, square, true to line, and with connections securely fastened. Cut cold formed framing members by sawing or shearing; do not torch cut.
 - 1. Fasten cold-formed metal framing members by welding. Comply with AWS D1.3 requirements and procedures.
 - 2. Fasten structural-steel framing members by welding. Comply with AWS D1.1 requirements and procedures for welding.
 - 3. Weld flex, gravity, and seismic anchors to panel framing.
 - 4. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
 - 5. Repair Painting: Touch up accessible damaged galvanized surfaces according to ASTM A 780 and painted surfaces using rust-inhibitive prime-paint material compatible with shop coat.

2.5 MIXES AND FABRICATION

- A. GFRC Mixes: Proportion backing mix of portland cement, glass fibers, sand, and selected admixtures. Provide nominal glass-fiber content of not less than 4-1/2 percent and no more than 6 percent.

1. Coloring Agent: The amount of coloring agent shall not exceed 10% of the cement weight.
2. Proportion face mix of portland cement, fine and coarse aggregates, and selected admixtures, with an air content of 3 to 10 percent; ASTM C 231.
3. Facing Mix: Thickness shall generally be the minimum possible to achieve the desired finish.
4. GFRC Skin:
 - a. Face Mix: Per skin design requirements. In no case shall the panel skin be less than 1/2 inch thick.
 - b. Backup mixes shall have same proportion of pigments as face mixes to eliminate the possibility of bleeding through of a different colored backup.

2.6 FABRICATION

- A. General: Manufacturing procedures shall be in compliance with PCI MNL 130.
- B. Fabrication Tolerances: As required to achieve erection tolerances and as follows; for dimensional tolerances not listed below, those listed in PCI MNL-130, shall apply:
 1. Overall height and width of units measured at the face adjacent to the form:
 - a. 3 m or under: +/- 1/8 inch.
 - b. 3 m and over: +/- 1/8 inch in 10 feet.
 2. Thickness:
 - a. Skin thickness: + 1/4 inch/- 0 inch.
 - b. Architectural facing thickness: +1/8 inch/ -0 inch.
 - c. Side return thickness: +1/2 inch/-0 inch.
 - d. Panel depth from face of skin to back of steel stud or integral rib: +1/8 inch/ -1/4 inch
 3. Angular variation of plane of side mold: 1/32 inch per 3 inch depth or 1/16 inch total, whichever is greater.
 4. Variation from square or designated skew (difference in length of the two diagonal measurements): 1/8 inch per 6 feet or 1/4 inch total, whichever is greater.
 5. Length and width of blockouts and openings within one unit: +/- 1/4 inch.
 6. Position Tolerances (measured from datum line locations as shown on the approved erection drawings):
 - a. Steel studs and tracks: +/- 1/4 inch.
 - b. Flashing reglets, at edge of panel: +/- 1/4 inch.
 7. Warpage: Maximum permissible warpage of one corner out of the plane of the other three shall be 1/16 inch per 12 inches distance from the nearest adjacent corner, or 1/4 inch total after installation.

8. Bowing: Not over $L/360$ with a maximum of one inch, where L is the panel length in the direction of the bow. Differential bowing as erected between adjacent members of the same design shall be 1/4 inch.
- C. Finish: Exposed finish surfaces shall match accepted samples and mockup panels in all respects. Provide panels with square edged, smooth joints prepared for field applied joint sealers. Allow concrete to obtain a sufficient strength prior to applying surface treatments to produce a GFRC finish consistent with accepted samples. Maintain consistent time interval (casting through finishing) for GFRC work. Protect false joints to preserve uniform straight, sharp corners. One of the following techniques may be used:
1. Sand or Abrasive Blast Finish: Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces to result in uniform color and texture.
 2. Acid Etched Finish: Use acid and hot water solution equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces to result in uniform color and texture.
- D. Molds: Construct forms of plywood, non-staining metal, concrete, or other acceptable forming material. Reinforce formwork in order that the fabricated units will comply with the details and dimensions shown, the required casting tolerances. Prevent leakage of paste and mortar, and the appearance of form joints on exposed panel faces, by constructing forms with tight joints.
1. Form joints will not be permitted on faces exposed to view in the finished work.
 2. Release agents shall be applied and used according to manufacturer's instructions. Use release agent that will not bond with, stain, or adversely affect GFRC surfaces and will not impair subsequent joint treatments of GFRC.
- E. Proportioning and Mixing:
1. All measurements of mix constituents shall be carried out in a careful manner to achieve the desired mix proportions.
 2. The glass fiber and cement slurry shall be metered to the spray head at rates to achieve the desired mix proportion and glass content. These shall be checked in accordance with standard procedures described in PCI MNL-130.
 3. Cleanliness of equipment and working procedure shall be maintained at all times.
- F. Hand Spray Application:
1. Spray operators shall be trained personnel.
 2. A mist coat consisting of the matrix without fiber may, if necessary, be sprayed onto the form. The thickness of this coating shall generally not exceed 1/16 inch in order to avoid an unreinforced surface.
 3. Spray-up of the main body of material shall proceed before any mist coat or facing mix has set.
 4. Application shall be by spraying such that uniform thickness and distribution of glass fiber and cement matrix is achieved during the application process.
 5. Consolidation shall be by rolling or such other techniques as necessary to achieve complete encapsulation of fibers and compaction.

6. Control of thickness shall be achieved by using a pin gauge or other approved method. A minimum of one measurement per each 0.46 square meters of panel surface shall be made.
7. All hand-forming of intricate details, incorporation of formers or infill material, and over-spraying shall be carried out before the material has achieved its initial set so as to ensure complete bonding.

G. Steel Stud Frame System:

1. Steel stud frame shall be a prefabricated welded frame produced in accordance with the approved erection drawings.
2. All accessible welds shall be touched up after welding.

H. Inserts and Embedments:

1. Rigid embedded items bonded to the GFRC shall not create undesirable restraint to volume changes.
2. Attach panel frame to GFRC before initial set of GFRC backing, maintaining a minimum clearance of 1/2 inch (13 mm) from GFRC backing, and without anchors protruding into GFRC backing.
3. Build up homogeneous GFRC bonding pads over anchor legs, maintaining a minimum thickness of 1/2 inch (13 mm) over top of anchor foot, before initial set of GFRC backing.
4. Inserts shall be properly embedded in built-up homogeneous GFRC bosses or bonding pads to develop their strength. Waste material such as over-spray is not acceptable to encapsulate inserts or for bonding pads.
5. Inserts and Embedments: Build up homogeneous GFRC bosses or bonding pads over inserts and embedments to provide sufficient anchorage and embedment to comply with design requirements.

I. Manufacturing Tolerances: Manufacture GFRC units so each finished panel complies with PCI MNL 130 for dimension, position, and stud frame tolerances.

J. Finish exposed-face surfaces of GFRC units as follows. Panel faces shall be free of joint marks, grain, or other obvious defects.

1. Finish: As selected by Architect.

K. Curing:

1. Immediately after the completion of spraying of each panel, a curing method shall be used to ensure sufficient strength for removing the units from the form.
2. After initial curing, remove panel from form and place in a controlled curing environment. Panels shall be kept continuously wet for a minimum of 7 days in accordance with manufacturer's standard curing practice. The temperature shall be maintained between 15.5 deg C and 48.9 deg C. during this period. In lieu of moist curing, acrylic thermoplastic copolymer dispersion shall be used as a curing admixture. Only copolymers shown to eliminate the need for moist curing through published independent laboratory test data shall be used.

L. Panel identification:

1. Mark each GFRC panel to correspond to identification marks on shop drawings for panel location.
 2. Mark each GFRC panel with date cast.
- M. Acceptance: Before delivery, examine and measure units to establish conformity with sizes and dimensions shown on shop drawings. Units whose dimensions vary or whose fastening devices are in excess of specified tolerances are unacceptable and shall be rejected. Discard and replace units which are cracked, chipped, stained, possess visible mold joints or irregular surfaces, have casting and aggregate segregation lines caused by placement, adjacent flat and return surfaces bearing greater texture and color differences than accepted on the mockup, ragged or irregular edges, reinforcement and insulation shadowlines, or are otherwise damaged. Patched units are not acceptable, except in specific instances when approved by the Architect, the unit may be repaired. The Architect reserves the right to reject any unit if it does not match the accepted samples and visual mockup.

2.7 CONTRACTOR TESTING

- A. Quality-Control Testing: Establish and maintain a quality-control program for manufacturing GFRC panels according to PCI MNL 130 and PCI MNL-128.
1. Test and inspect GFRC production. Include material acceptance testing, preproduction testing, aggregate production testing, wet production testing, and production testing after curing.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Deliver anchorage devices that are embedded in or attached to the building structural frame before start of such work. Provide locations, setting diagrams, and templates for the proper installation of each anchorage device.

3.2 INSPECTION

- A. Before beginning the erection of the GFRC units, examine all parts of the supporting structural frame and the conditions under which the Work is to be performed. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.3 ERECTION

- A. Lift GFRC units at lifting points established by manufacturer and install without damaging units. Install clips, hangers, and other accessories required for connecting GFRC units to supporting members and backup materials.

- B. Install GFRC units level, plumb, square, and in alignment. Provide temporary supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed. Maintain horizontal and vertical joint alignment and uniform joint width. Remove projecting hoisting devices.
- C. Anchor GFRC units in position by bolting or welding, or both, as indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as possible after anchoring is completed.
- D. Welding: Comply with AWS D1.1 and AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - 1. Protect GFRC units from damage by field welding or cutting operations, and provide noncombustible shields as required.
- E. At bolted connections, use lock washers or other acceptable means to prevent loosening of nuts.

3.4 ERECTION TOLERANCES

- A. Tolerances for location of GFRC units shall be non-cumulative and as listed below. For erection tolerances not listed below, those listed in PCI MNL-130 shall apply.
- B. Tolerance for Face Width of Joint:
 - 1. Panel dimension 10 feet or less : +/- 3/16 inch.
 - 2. Panel dimension 10 to 20 feet: +/- 1/4 inch.
 - 3. Panel dimension greater than 20 feet: +/- 3/8 inch.
- C. Erect GFRC units to comply with PCI MNL 130 noncumulative tolerances.

3.5 INSPECTION AND ACCEPTANCE

- A. Acceptance: Final inspection and acceptance of erected GFRC panels shall be made by the architect to verify conformance with plans and specifications.
- B. Rejection: Panels may be rejected for any one of the following product defects or installation deficiencies remaining after repairs and cleaning have been accomplished. "Visible" means visible to a person with normal eyesight when viewed from a distance of 20 feet in broad daylight.
 - 1. Nonconformance to specified tolerances.
 - 2. Air voids (bug-holes or blowholes) larger than 3/8 inch in diameter.
 - 3. Visible casting lines.
 - 4. Visible form joints.
 - 5. Visible irregularities.
 - 6. Visible stains on panel surface.
 - 7. Visible differences between panel and approved sample.

8. Visible non-uniformity of textures or color.
9. Visible areas of backup concrete bleeding through the facing concrete.
10. Visible foreign material embedded in the face.
11. Visible repairs or cracks.
12. Visible reinforcement shadow lines.

3.6 REPAIRS

- A. Replace any unit which exhibits damage to surfaces, finish, corners or edges which will be exposed to view after erection, or which is broken or cracked due to shrinkage, transportation, handling or erection, except that in specific instances when accepted by the Architect, the unit may be repaired in place.
 1. Before commencing any repairs, the Contractor shall demonstrate his proposed repair techniques on sample panels. Such techniques and their results shall be subject to review and acceptance by the Architect before repair work commences on the building. Where required, include aggregates matching original aggregates for repair of cladding units.
 2. Patching: Establish by trial mix a formula for the patching of the finish(es). Patches (if any) shall be indistinguishable from the surrounding area.
- B. Acceptance of repaired units by the Architect is contingent upon the repairs being done skillfully so as to be sound, permanent, flush with adjacent surfaces, and of color and texture matching adjoining surfaces and showing no apparent line of demarcation between original and repaired work. The Architect's decision will be final with respect to acceptance or rejection of repaired units.
- C. Touch Up Galvanized Metal Surfaces: Touch up metal surfaces where welding or other erection operations have caused galvanized coatings to become damaged. Perform touch up priming as soon as possible after erection and prior to the appearance of excess rust formation. Prepare surface(s) to be touched up using cleaning procedures as recommended by the manufacturer of the primer.
 1. For Galvanized Metal Surfaces: For galvanized surfaces apply galvanizing repair paint to comply with ASTM A 780.

3.7 CLEANING

- A. After the exterior wall cladding components have been installed clean the GFRC work with soap detergent and water, using soft fiber brushes and sponges, and rinse thoroughly with clean water. Use cleaning materials, or processes that will not change, or damage, the exposed exterior wall cladding materials. Remove surface stains as recommended by the GFRC manufacturer.
- B. Blend and mix patching materials and repair GFRC so cured patches match color, texture, and uniformity of adjacent exposed surfaces.
- C. Prepare and repair damaged galvanized coatings on metal framing, anchors, and subsystems with galvanizing repair paint according to ASTM A 780.

- D. Wire brush, clean, and paint accessible scarred areas, welds, and rust spots on prime-painted metal framing, anchors, and subsystems. Paint with same type of shop paint used on adjacent surfaces.
- E. Remove and replace damaged GFRC units when repairs do not comply with requirements.
- F. Perform cleaning procedures according to GFRC manufacturer's written instructions. Clean soiled GFRC surfaces with detergent and water, using soft fiber brushes and sponges, and rinse with clean water.

3.8 PROTECTION OF WORK

- A. The erector shall be responsible for protection of the panels from damage by the erection crews, field welding or cutting operations by providing non-combustible shields as necessary during these operations.
- B. The erector shall be responsible for any chipping, spalling, cracking or other damage to the units after delivery to the jobsite unless damage is caused by others during site storage.
- C. After installation is complete and after any damaged or soiled panels have been cleaned, repaired, inspected and approved, further damage is the responsibility of the contractor. Prevent damage to GFRC surfaces and to adjacent materials.

END OF SECTION

SECTION 050519- POST-INSTALLED CONCRETE ANCHORS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Cast-in and drilled in anchors for concrete.
- B. Related Sections:
 - 1. Division 3 Concrete Sections.

1.02 SUBMITTALS

- A. General: Submit in accordance with *Conditions of the Contract* and Division 1 Submittal Procedures Section.
 - 1. Product specifications with recommended design values and physical characteristics for epoxy dowels, expansion and undercut anchors.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Drilled-in anchors shall be installed by a contractor with at least three years of experience performing similar installations.
- B. Installer Training: Conduct a thorough training with the manufacturer or the manufacturer's representative for the contractor on the project. Training to consist of a review of the complete installation process for drilled-in anchors, to include but not limited to:
 - 1. hole drilling procedure
 - 2. hole preparation & cleaning technique
 - 3. adhesive injection technique & dispenser training / maintenance
 - 4. rebar dowel preparation and installation
- C. Certifications: Unless otherwise authorized by the Engineer, anchors shall have one of the following certifications:
 - 1. ICC ES Evaluation Report indicating conformance with current applicable ICC ES Acceptance Criteria.

1.04 DELIVERY, STORAGE AND HANDLING

- A. General: Comply with Division 1 Section–Product Storage and Handling Requirements.
 - 1. Store anchors in accordance with manufacturer's recommendations.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Fasteners and Anchors:
1. Bolts and Studs: ASTM A307; ASTM A449 where “high strength” is indicated on the Drawings.
 2. Carbon and Alloy Steel Nuts: ASTM A563.
 3. Carbon Steel Washers: ASTM F436.
 4. Carbon Steel Threaded Rod: ASTM A36; or ASTM A193 Grade B7; or ISO 898 Class 5.8.
 5. Wedge Anchors: ASTM A510; or ASTM A108.
 6. Stainless Steel Bolts, Hex Cap Screws, and Studs: ASTM F593.
 7. Stainless Steel Nuts: ASTM F594.
 8. Zinc Plating: ASTM B633.
 9. Hot-Dip Galvanizing: ASTM A153.
 10. Reinforcing Dowels: ASTM A615

2.02 DRILLED-IN ANCHORS

- A. Wedge Anchors: Wedge type, torque-controlled, with impact section to prevent thread damage complete with required nuts and washers. Provide anchors with length identification markings conforming to ICC ES AC01 or ICC ES AC193. Type and size as indicated on Drawings.
1. Exterior Use: As indicated on the Drawings, provide stainless steel anchors. Stainless steel anchors shall be AISI Type 304 and Type 316 stainless steel provided with stainless steel nuts and washers of matching alloy group and minimum proof stress equal to or greater than the specified minimum full-size tensile strength of the externally threaded fastener. Stainless steel nuts shall conform to ASTM F594 unless otherwise specified. Avoid installing stainless steel anchors in contact with galvanically dissimilar metals.
- A. Screw Anchors: screw type. Pre-drilling of the hole requires a standard ANSI drill bit with the same diameter as the anchor and installing the anchor will be done with an impact wrench. Provide anchors with a diameter and anchor length marking on the head. Type and size as indicated on Drawings.
1. Interior Use: Unless otherwise indicated on the Drawings, provide carbon steel anchors with zinc plating equivalent to DIN EN ISO 4042 (8µm min.).
 2. Where anchor manufacturer is not indicated, subject to compliance with requirements and acceptance by the Engineer, provide the following:
 - a. Hilti Kwik-HUS-EZ, ICC-ESR 3027.
 - b. Hilti Kwik-HUS EZ-I, ICC-ESR 3027.
 - c. Hilti Kwik-HUS.

- B. Cartridge Injection Adhesive Anchors: Threaded steel rod, inserts or reinforcing dowels, complete with nuts, washers, polymer or hybrid mortar adhesive injection system, and manufacturer's installation instructions. Type and size as indicated on Drawings.
 - 1. Exterior Use: As indicated on the Drawings, provide stainless steel anchors. Stainless steel anchors shall be AISI Type 304 and Type 316 stainless steel provided with stainless steel nuts and washers of matching alloy group and minimum proof stress equal to or greater than the specified minimum full-size tensile strength of the externally threaded fastener. All nuts shall conform to ASTM F594 unless otherwise specified. Avoid installing stainless steel anchors in contact with galvanically dissimilar metals.
 - 2. Reinforcing dowels shall be A615 Grade 60.
 - 3. Where anchor manufacturer is not indicated, subject to compliance with requirements and acceptance by the Engineer, provide the following:
 - a. Hilti HAS threaded rods with HIT-HY 200 Safe Set System using Hilti Hollow Drill Bit and VC 20/40 vacuum System for anchor and rebar anchorage to concrete, ICC ESR-3187.
 - b. Hilti HIT-Z anchor rods with HIT-HY 200 Safe Set System for anchorage to concrete, ICC ESR-3187.
 - c. Hilti HAS threaded rods with HIT-RE 500 V3 Safe Set System using Hilti Hollow Drill Bit and VC 20/40 vacuum System for anchor and rebar anchorage to concrete, ICC ESR-3814.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Cast-In-Place Bolts: Use templates to locate bolts accurately and securely in formwork.
- B. Drilled-In Anchors:
 - 1. Drill holes with rotary impact hammer drills using carbide-tipped bits, hollow drill bit system, and or core drills using diamond core bits. Drill bits shall be of diameters as specified by the anchor manufacturer. Unless otherwise shown on the Drawings, all holes shall be drilled perpendicular to the concrete surface.
 - a. Cored Holes: Where anchors are permitted to be installed in cored holes, use core bits with matched tolerances as specified by the manufacturer. Properly clean cored hole per manufacturer's instructions.
 - b. Embedded Items: Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Exercise care in coring or drilling to avoid damaging existing reinforcing or embedded items. Notify the Engineer if reinforcing steel or other embedded items are encountered during drilling. Take precautions as necessary to avoid damaging prestressing tendons, electrical and telecommunications conduit, and gas lines.
 - c. Base Material Strength: Unless otherwise specified, do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.

2. Perform anchor installation in accordance with manufacturer instructions.
3. Wedge Anchors, Heavy-Duty Sleeve Anchors, and Undercut Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in part to be fastened. Set anchors to manufacturer's recommended torque, using a torque wrench. Following attainment of 10% of the specified torque, 100% of the specified torque shall be reached within 7 or fewer complete turns of the nut. If the specified torque is not achieved within the required number of turns, the anchor shall be removed and replaced unless otherwise directed by the Engineer.
4. Cartridge Injection Adhesive Anchors: Clean all holes per manufacturer instructions to remove loose material and drilling dust prior to installation of adhesive. Inject adhesive into holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive. Follow manufacturer recommendations to ensure proper mixing of adhesive components. Sufficient adhesive shall be injected in the hole to ensure that the annular gap is filled to the surface. Remove excess adhesive from the surface. Shim anchors with suitable device to center the anchor in the hole. Do not disturb or load anchors before manufacturer specified cure time has elapsed.
5. Capsule Anchors: Perform drilling and setting operations in accordance with manufacturer instructions. Clean all holes to remove loose material and drilling dust prior to installation of adhesive. Remove water from drilled holes in such a manner as to achieve a surface dry condition. Capsule anchors shall be installed with equipment conforming to manufacturer recommendations. Do not disturb or load anchors before manufacturer specified cure time has elapsed.
6. Observe manufacturer recommendations with respect to installation temperatures for cartridge injection adhesive anchors and capsule anchors.

3.02 REPAIR OF DEFECTIVE WORK

- A. Remove and replace misplaced or malfunctioning anchors. Fill empty anchor holes and patch failed anchor locations with high-strength non-shrink, nonmetallic grout. Anchors that fail to meet proof load or installation torque requirements shall be regarded as malfunctioning.

3.03 FIELD QUALITY CONTROL

- A. Adhesive anchors and capsule anchors shall not be torque tested unless otherwise directed by the Engineer.
- B. Minimum anchor embedments shall be as shown on the Drawings.

END OF SECTION 050519

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel.
2. Shear stud connectors, shop welded.
3. Shrinkage-resistant grout.

B. Related Requirements:

1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.

1.2 DEFINITIONS

- ##### A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Structural-steel materials.
2. High-strength, bolt-nut-washer assemblies.
3. Anchor rods.
4. Threaded rods.
5. Forged-steel hardware.

- ##### B. Shop Drawings: Show fabrication of structural-steel components.

1.4 INFORMATIONAL SUBMITTALS

- ##### A. Welding certificates.
- ##### B. Mill test reports for structural-steel materials, including chemical and physical properties.
- ##### C. Source quality-control reports.
- ##### D. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).
- B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with applicable provisions of the following specifications and documents:
 - 1. ANSI/AISC 303.
 - 2. ANSI/AISC 360.
- B. Connection Design Information:
 - 1. Connection designs have been completed and connections indicated on the Drawings.

2.2 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A992/A992M.
- B. Channels, Angles: ASTM A36/A36M.
- C. Plate and Bar: ASTM A36/A36M and ASTM A572/A572M, Grade 50.
- D. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade C structural tubing.
- E. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B. For sections indicated XXS, provide ASTM A106 grade B with Sch. 160 minimum thickness.
- F. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS AND CONNECTORS

- A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
- B. High-Strength A490 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A490, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.

2.4 PRIMER

A. Steel Primer:

1. Comply with requirements in Section 051213 "High-Performance Coatings."

B. Galvanized-Steel Primer: MPI#134.

1. Etching Cleaner: MPI#25, for galvanized steel.
2. Galvanizing Repair Paint: ASTM A780/A780M.

2.5 SHRINKAGE-RESISTANT GROUT

- ### A. Metallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

- ### A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.

2.7 SHOP CONNECTIONS

- ### A. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.8 GALVANIZING

- ### A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.

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 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.
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces unless indicated to be painted.
6. Surfaces enclosed in interior construction.

- B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:
 - 1. SSPC-SP 2.
- C. Surface Preparation of Galvanized Steel: Prepare galvanized-steel surfaces for shop priming by thoroughly cleaning steel of grease, dirt, oil, flux, and other foreign matter, and treating with etching cleaner or in accordance with SSPC-SP 16.
- D. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.10 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
 - 1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
 - 2. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E165/E165M.
 - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - c. Ultrasonic Inspection: ASTM E164.
 - d. Radiographic Inspection: ASTM E94/E94M.
 - 3. 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.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.

- B. Baseplates: 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 shrinkage-resistant 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 grouting.
- C. Maintain erection tolerances of structural steel within ANSI/AISC 303.

3.3 FIELD CONNECTIONS

- A. 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 ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a 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.
 - 1. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.
 - a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1) Liquid Penetrant Inspection: ASTM E165/E165M.
 - 2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3) Ultrasonic Inspection: ASTM E164.
 - 4) Radiographic Inspection: ASTM E94/E94M.

END OF SECTION 051200

SECTION 051213 - ARCHITECTURALLY EXPOSED 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. Architecturally exposed structural steel (AESS).
 - 2. Section 051200 "Structural Steel Framing" requirements that also apply to AESS.

1.3 DEFINITIONS

- A. AESS: Architecturally exposed structural steel.

1.4 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS.
 - 1. Identify AESS category for each steel member and connection, including transitions between AESS categories and between AESS and non-AESS.
- B. Samples: Submit Samples to set quality standards for AESS.
 - 1. Full shade structure top panel with all segments welded, ground, and painted, and full support pipe assembly, including the transition of at least one of the support pipes to below the perforated panel level. Extend pipe support to at least 2' below canopy level to allow for transition review.
 - 2. Sample of curved reinforced pipe section per structural drawings. If desired, may be incorporated into top panel sample listed above.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172) and is experienced in fabricating AESS similar to that indicated on this Project.

- B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program, is designated an AISC-Certified Erector, Category ACSE or Category CSE, and is experienced in erecting AESS similar to that indicated on this Project.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Use special care in handling AESS to prevent twisting, warping, nicking, and other damage during fabrication, delivery, and erection. Store materials to permit easy access for inspection and identification. Keep AESS members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect AESS members and packaged materials from corrosion and deterioration.
 - 1. Do not store AESS 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.

1.7 FIELD CONDITIONS

- A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

1.8 WARRANTY

- A. Warranty, High Performance Organic Coatings: Submit a warranty for a period of 20 years, warranting the integrity of film and permanence of color of the high performance organic coatings for the following:
 - 1. Color fade not to exceed 5 delta E units (Hunter) as calculated in accordance with ASTM D 2244 on exposed surfaces cleaned with clean water and a soft cloth.
 - 2. Degree of chalking not to exceed rating No. 8 when measured in accordance with ASTM D 4214 on exposed unwashed surfaces
 - 3. Will not crack, check, or peel

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with requirements of ANSI/AISC 303, Sections 1 through 9 and as modified in Section 10, "Architecturally Exposed Structural Steel."

2.2 FILLER

- A. Polyester filler intended for use in repairing dents in automobile bodies.

2.3 PRIMER

A. Steel Primer:

1. Comply with Section 099600 "High-Performance Coatings."

2.4 FABRICATION

A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.

1. Use special care handling and fabricating AESS before and after shop painting to minimize damage to shop finish.
2. All shade structure assemblies shall be fabricated to category AESS 3

B. Category AESS 1:

1. Comply with overall profile dimensions of AWS D1.1/D1.1M for welded built-up members. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
2. Prepare surfaces according to Part 2 "Shop Priming" Article and SSPC-SP 6 (WAB)/NACE WAB-3.
3. Grind sheared, punched, and flame-cut edges to remove burrs and provide smooth surfaces and eased edges.
4. Make intermittent welds appear continuous, using filler or additional welding.
5. Seal weld open ends of hollow structural sections with 3/8-inch closure plates.
6. Limit butt and plug weld projections to 1/16 inch.
7. Install bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
8. Remove weld spatter, slivers, and similar surface discontinuities.
9. Remove blemishes and surface irregularities resulting from temporary braces or fixtures by filling or grinding, before cleaning, treating, and shop priming.
10. Grind tack welds smooth unless incorporated into final welds.
11. Remove backing and runoff tabs, and grind welds smooth.

C. Category AESS 2: In addition to requirements for Category AESS 1, comply with the following:

1. Limit as-fabricated straightness tolerance to one-half that permitted for structural-steel materials in ANSI/AISC 303.
2. Limit as-fabricated curved structural steel tolerance to that permitted for structural-steel materials in ANSI/AISC 303.
3. Limit as-fabricated straightness tolerance of welded built-up members to one-half that permitted by AWS D1.1/D1.1M.
4. Conceal fabrication and erection markings from view in the completed structure.
5. Make welds uniform and smooth.

- D. Category AESS 3: In addition to requirements for Category AESS 1 and AESS 2, comply with the following:
1. Cut out mill marks from mill material or hide these markings from view in the completed structure. Where neither method is possible, remove mill marks by grinding and filling surfaces as approved by Architect.
 2. Grind butt and plug welds smooth or fill, removing weld splatter exposed to view.
 3. Orient HSS seams as indicated or away from view.
 4. Align and match abutting member cross sections.
 5. At visible open joints of copes, miters, and cuts, maintain uniform clear gaps of 1/8 inch. At closed joints, maintain uniform contact within 1/16 inch
 6. Fabricate with exposed surfaces smooth, square, and of surface quality approved by Architect.

2.5 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A123/A123M.
1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
 2. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

2.6 STEEL FINISHES

- A. High-performance Organic Finish: Three-coat PVDF fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.
- C. 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 AESS 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. Take special care during erection to avoid marking or distorting the AESS and to minimize damage to shop painting. Set AESS accurately in locations and to elevations indicated and according to ANSI/AISC 303 and ANSI/AISC 360.
 - 1. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Take care to avoid any blemishes, holes, or unsightly surfaces resulting from the use or removal of temporary elements.
 - 2. Grind tack welds smooth.
 - 3. Remove backing and runoff tabs, and grind welds smooth.
 - 4. Orient bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
 - 5. Remove erection bolts in AESS, fill holes with weld metal or filler, and grind or sand smooth to achieve surface quality approved by Architect.
 - 6. Fill weld access holes in AESS with weld metal or filler and grind, or sand smooth to achieve surface quality as approved by Architect.
 - 7. Conceal fabrication and erection markings from view in the completed structure.

3.4 REPAIR

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and touchup galvanizing to comply with ASTM A780/A780M.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to inspect AESS as specified in Section 051200 "Structural Steel Framing." The testing agency is not responsible for enforcing requirements relating to aesthetic effect.
- B. Architect will observe AESS in place to determine acceptability relating to aesthetic effect.

END OF SECTION 051213

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Shear wall panels.
4. Rooftop equipment bases and support curbs.
5. Wood blocking and nailers.
6. Wood furring.
7. Wood sleepers.
8. Plywood backing panels.

1.2 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Post-installed anchors.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- ##### A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:

1. Boards: 19 percent.
2. Dimension Lumber: 19 percent unless otherwise indicated.

- ##### C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable design stresses, as published by manufacturer, are to meet or exceed those indicated. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 PRESERVATIVE TREATMENT

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions by Grade: Construction or No. 2 grade.
 1. Application: Interior partitions not indicated as load bearing.
 2. Species:
 - a. Western woods; WCLIB or WWPA.
- B. Framing Other Than Non-Load-Bearing Partitions by Grade: No. 2 grade.
 1. Application: Framing other than interior partitions not indicated as load bearing.
 2. Species:
 - a. Hem-fir (north); NLGA.
 - b. Southern pine; SPIB.
 - c. Douglas fir-larch; WCLIB or WWPA.
 - d. Southern pine or mixed southern pine; SPIB.

- e. Spruce-pine-fir; NLGA.
- f. Douglas fir-south; WWPA.
- g. Hem-fir; WCLIB or WWPA.
- h. Douglas fir-larch (north); NLGA.
- i. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

2.4 ENGINEERED WOOD PRODUCTS

- A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559.
 1. Extreme Fiber Stress in Bending, Edgewise: 2600 psi for 12-inch nominal-depth members.
 2. Modulus of Elasticity, Edgewise: 2,000,000 psi.

2.5 MISCELLANEOUS LUMBER

- A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases and support curbs.
 4. Cants.
 5. Furring.
 6. Grounds.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.
- C. Concealed Boards: 19 percent maximum moisture content and the following species and grades:
 1. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.

2.6 FASTENERS

- A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.
 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
- B. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 ICC-ES AC58 ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.

2.7 METAL FRAMING ANCHORS

- A. Allowable design loads, as published by manufacturer, are to meet or exceed those of basis-of-design products. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors are to be punched for fasteners adequate to withstand same loads as framing anchors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- D. Install shear wall panels to comply with manufacturer's written instructions.
- E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- H. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).

2. ICC-ES evaluation report for fastener.

3.2 PROTECTION

- A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes miscellaneous carpentry.

1.2 ACTION SUBMITTALS

- A. Product Data: Submit product data for each type of process and factory-fabricated product indicated.
 - 1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that materials comply with requirements.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels; for lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: Comply with DOC PS 20 "American Softwood Lumber Standard" and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 3. Provide dressed lumber, S4S, unless otherwise indicated.
 - 4. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.
- B. Wood Panels:
 - 1. Plywood: Comply with DOC PS 1 "Construction and Industrial Plywood" for plywood panels. Use exterior grade for panels in wet conditions.
 - 2. Thickness: As needed to comply with requirements specified but not less than thickness indicated.

2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Provide chemical fire retardant process tested and labeled by UL with flame spread and smoke developed ratings of 25 or less. Comply with performance requirements in AWPA U1, Use Category UCFA as a minimum for pressure treatment. Size wood before treatment so that minimum cutting will be required after treatment. Kiln dry lumber to a maximum 19 percent moisture content, kiln dry plywood to a maximum 15 percent moisture content, after treatment. Treat indicated items and the following:
 - 1. Wood members required to be treated by Building Code having jurisdiction at the site and wood members specified as fire-retardant-treated.
- B. Identify fire-retardant-treated wood with appropriate classification marking of UL.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.

2.4 MISCELLANEOUS LUMBER

- A. Provide miscellaneous lumber for support or attachment of other construction, including blocking, nailers, and similar members.
- B. For concealed boards, provide lumber with 19 percent maximum moisture content and the following species and grades:
 - 1. Mixed southern pine, No. 2 grade; SPIB.
 - 2. Western Woods; WCLIB or WWPA, No. 2 Grade.

2.5 PANEL PRODUCTS

- A. Medium-Density Fiberboard (Moisture Resistant): A sustainable, moisture-resistant, medium density fiberboard (MDF) panel manufactured from minimum 92 percent preconsumer recycled wood fiber complying with ANSI A208.2, Grade 155, having a minimum 48 pcf (769 kg/m³) density except that minimum for screw holding capacity on face shall be 325 pounds (1445 N); an ASTM E 84 Class C flame spread rating, minimum 3/4 inch (19 mm) thick, edged and faced as specified, fabricated with binder containing no added urea formaldehyde.
1. Roseburg Forest Products; NAUF FSC Certified Medex.
- B. Medium-Density Fiberboard (fire rated): A sustainable, fire rated, medium density fiberboard (MDF) panel manufactured from minimum 82 percent recycled wood fiber complying with ANSI A208.2, Grade 130, having a minimum 48 pcf (769 kg/m³) density except that minimum for screw holding capacity on face shall be 250 pounds (1112N); an ASTM E 84 Class A flame spread rating, minimum 3/4 inch (19 mm) thick, edged and faced as specified, fabricated with binder containing no added urea formaldehyde.
1. Roseburg Forest Products; NAUF FSC Certified Medite FR.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
- B. Power-Driven Fasteners: NES NER-272.
- C. Nails, Wire, Brads, and Staples: Select material, type, size, and finish required for each use.
1. ASTM F 1667 for driven fasteners such as nails, spikes and staples.
 2. ASTM F 547 for nails used with wood and wood based products.
- D. Wood Screws: Select material, type, size, and finish required for each use. Comply with ASME B18.6.1.
- E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.
- C. Use fasteners of appropriate type and length. Pre-drill members when necessary to avoid splitting wood.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.3 PANEL PRODUCT INSTALLATION

- A. General: Comply with applicable recommendations contained in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial," and local utility requirements, if any, for plywood backing panels utilized as indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 1. Plywood Backing Panels: Secure to wall using proper fastening devices for substrates encountered spaced 12 inches (305 mm) on center maximum at perimeter 1/2 inch (12.7 mm) from corners and three rows of 3 fasteners each in the backerboard field. Countersink fasteners flush with plywood surface. Butt adjacent panels without lapping.

END OF SECTION

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Parapet sheathing.
4. Composite nail base insulated roof sheathing.
5. Subflooring.
6. Underlayment.
7. Sheathing joint and penetration treatment.

PART 2 - PRODUCTS

2.1 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.2 WALL SHEATHING

- A. Plywood Sheathing, Walls: Either DOC PS 1 or DOC PS 2, Exterior, Structural I sheathing.
- B. Oriented-Strand-Board Sheathing, Walls: DOC PS 2, Exposure 1, Structural I sheathing.

2.3 ROOF SHEATHING

- A. Plywood Sheathing, Roofs: Either DOC PS 1 or DOC PS 2, Exterior, Structural I sheathing.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
2. For roof and wall sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours in accordance with ASTM B117.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 1. Table 2304.10.1, "Fastening Schedule," in the ICC's International Building Code.
 2. ICC-ES evaluation report for fastener.
- D. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 1. Wall and Roof Sheathing:
 - a. Nail to wood framing.
 - b. Screw to cold-formed metal framing.
 - c. Space panels 1/8 inch apart at edges and ends.

END OF SECTION 061600

SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

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. Modified bituminous sheet waterproofing.
 - 2. Modified bituminous sheet waterproofing, fabric reinforced.
 - 3. Modified bituminous deck-paving sheet waterproofing.
 - 4. Blindside sheet waterproofing.
 - 5. Pedestal-supported plaza-deck pavers.
- B. Related Requirements:
 - 1. Section 07 95 13.16 "Exterior Expansion Joint Cover Assemblies" for exterior-wall expansion-joint assemblies that interface with waterproofing.
 - 2. Section 07 95 13.19 "Parking Deck Expansion Joint Cover Assemblies" for deck expansion-joint assemblies that interface with waterproofing.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
 - 2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.
- B. Sustainable Design Submittals:

1. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each regional material.
- C. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, expansion joints, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
 1. Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.
- D. Samples: For each exposed product and for each color and texture specified, including the following products:
 1. 8-by-8-inch square of waterproofing and flashing sheet.
 2. 4-by-4-inch square of drainage panel.
 3. Plaza-deck paver, 4-by-4-inch square, in each color and texture required.
 4. Paver pedestal assembly.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Field quality-control reports.
- C. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to set quality standards for installation.
 1. Build for each typical waterproofing installation including pavers and accessories to demonstrate surface preparation, crack and joint treatments, inside and outside corner treatments, and protection.
 - a. Size: As indicated on Drawings.
 - b. Description: Each type of wall installation.
 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 FIELD CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
 - 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- B. Installer's Special Warranty: Specified form, on warranty form at end of this Section, signed by Installer, covering Work of this Section, for warranty period of two years.
 - 1. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pavers on plaza decks.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Waterproofing System: Obtain waterproofing materials, protection course, molded-sheet drainage panels from single source from single manufacturer.
- B. Source Limitations for Plaza-Deck Paving: Obtain plaza-deck pavers and paver pedestals from single source from single manufacturer.

2.2 MODIFIED BITUMINOUS SHEET WATERPROOFING

- A. Modified Bituminous Sheet: Minimum 60-mil nominal thickness, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated on one side to a 4-mil- thick, polyethylene-film reinforcement, and with release liner on adhesive side; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
 - 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. American Hydrotech, Inc.

- b. Carlisle Coatings & Waterproofing Inc.
 - c. CETCO, a Minerals Technologies company.
 - d. GCP Applied Technologies Inc. (formerly Grace Construction Products).
 - e. Henry Company.
 - f. MAPEI Corporation.
 - g. Polyguard Products, Inc.
 - h. Protecto Wrap Company.
 - i. Soprema, Inc.
 - j. Tamko Building Products, Inc.
 - k. W. R. Meadows, Inc.
 - l. York Manufacturing, Inc.
 - m. Insert manufacturer's name.
2. Physical Properties:
 - a. Tensile Strength, Membrane: 250 psi minimum; ASTM D 412, Die C, modified.
 - b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
 - c. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D 1970/D 1970M.
 - d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement; ASTM C 836/C 836M.
 - e. Puncture Resistance: 40 lbf minimum; ASTM E 154/E 154M.
 - f. Water Absorption: 0.2 percent weight-gain maximum after 48-hour immersion at 70 deg F; ASTM D 570.
 - g. Water Vapor Permeance: 0.05 perm maximum; ASTM E 96/E 96M, Water Method.
 - h. Hydrostatic-Head Resistance: 200 feet minimum; ASTM D 5385.
 3. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.
- B. Modified Bituminous Sheet, Fabric Reinforced: Minimum 60-mil nominal thickness, self-adhering sheet consisting of rubberized-asphalt membrane with embedded fabric reinforcement, and with release liner on adhesive side.
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. Protecto Wrap Company.
 - b. Royston.
 2. Physical Properties:
 - a. Pliability: No cracks when bent 180 degrees over a 1-inch mandrel at minus 25 deg F; ASTM D 146/D 146M.
 - b. Puncture Resistance: 40 lbf minimum; ASTM E 154/E 154M.
 - c. Water Vapor Permeance: 0.05 perm maximum; ASTM E 96/E 96M, Water Method.

3. Sheet Strips: Self-adhering, reinforced, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.3 MODIFIED BITUMINOUS DECK-PAVING SHEET WATERPROOFING

- A. Modified Bituminous Deck-Paving Sheet: Minimum 65-mil nominal thickness, self-adhering sheets designed to be overlaid with asphalt paving; consisting of rubberized-asphalt membrane with woven or nonwoven fabric reinforcement laminated to one surface or embedded within the membrane, and with release liner on adhesive side.
 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. Carlisle Coatings & Waterproofing Inc.
 - b. Polyguard Products, Inc.
 - c. Protecto Wrap Company.
 - d. Royston.
 - e. W. R. Meadows, Inc.
 2. Physical Properties:
 - a. Tensile Strength, Membrane: 50 lbf/in. minimum; ASTM D 882.
 - b. Pliability: Unaffected when bent 180 degrees over a 1/4-inch mandrel at minus 15 deg F; ASTM D 146/D 146M.
 - c. Puncture Resistance: 40 lbf minimum; ASTM E 154/E 154M.
 3. Sheet Strips: Self-adhering, reinforced, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.4 BLINDSIDE SHEET WATERPROOFING

- A. Blindside Sheet Waterproofing for Vertical Applications: Uniform, flexible, multilayered-composite sheet membrane that forms a permanent bond with fresh concrete placed against it; complete with accessories and preformed shapes for an unbroken waterproofing assembly; with the following physical properties:
 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. Carlisle Coatings & Waterproofing Inc.
 - b. GCP Applied Technologies Inc. (formerly Grace Construction Products).
 - c. Polyguard Products, Inc.
 - d. W. R. Meadows, Inc.
 2. Physical Properties:

- a. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D 1970/D 1970M.
 - b. Peel Adhesion to Concrete: 5 lbf/in. minimum; ASTM D 903, modified.
 - c. Lap Adhesion: 5 lbf/in. minimum; ASTM D 1876, modified.
 - d. Hydrostatic-Head Resistance: 230 feet; ASTM D 5385, modified.
 - e. Puncture Resistance: 100 lbf minimum; ASTM E 154/E 154M.
 - f. Water Vapor Permeance: 0.1 perm maximum; ASTM E 96/E 96M, Water Method.
 - g. Ultimate Elongation: 335 percent minimum; ASTM D 412, modified.
- B. Blindsight Sheet Waterproofing for Horizontal Applications: Uniform, flexible, multilayered-composite sheet membrane that forms a permanent bond with fresh concrete placed against it; complete with accessories and preformed shapes for an unbroken waterproofing assembly; with the following physical properties:
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. Carlisle Coatings & Waterproofing Inc.
 - b. GCP Applied Technologies Inc. (formerly Grace Construction Products).
 - c. Polyguard Products, Inc.
 - d. W. R. Meadows, Inc.
 2. Physical Properties:
 - a. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D 1970/D 1970M.
 - b. Peel Adhesion to Concrete: 5 lbf/in. minimum; ASTM D 903, modified.
 - c. Lap Adhesion: 5 lbf/in. minimum; ASTM D 1876, modified.
 - d. Hydrostatic-Head Resistance: 230 feet; ASTM D 5385, modified.
 - e. Puncture Resistance: 200 lbf minimum; ASTM E 154/E 154M.
 - f. Water Vapor Permeance: 0.1 perm maximum; ASTM E 96/E 96M, Water Method.
 - g. Ultimate Elongation: 335 percent minimum; ASTM D 412, modified.
- C. Mastic, Adhesives, and Detail Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

2.5 AUXILIARY MATERIALS

- A. Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid waterborne solvent-borne primer recommended for substrate by sheet-waterproofing material manufacturer.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet-waterproofing material manufacturer.

- D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.
- E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.
- F. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch, predrilled at 9-inch centers.
- G. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
 - 1. Thickness: Nominal 1/8 inch for vertical applications; 1/4 inch elsewhere.
 - 2. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for protection course type.
- H. Protection Course: Fan folded, with a core of extruded-polystyrene board insulation faced on both sides with plastic film, nominal thickness 1/4 inch, with compressive strength of not less than 8 psi per ASTM D 1621, and maximum water absorption by volume of 0.6 percent per ASTM C 272/C 272M.
- I. Protection Course: Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, 1/2 inch thick.
- J. Protection Course: Molded-polystyrene board insulation, ASTM C 578, Type I, 0.90-lb/cu. ft. minimum density, 1-inch minimum thickness.

2.6 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel with Polymeric Film: Composite subsurface drainage panel acceptable to waterproofing manufacturer and consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate through the core of 9 to 21 gpm per ft. Insert values.
 - 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. American Hydrotech, Inc.
 - b. BASF Corporation; Construction Systems.
 - c. Carlisle Coatings & Waterproofing Inc.
 - d. CETCO, a Minerals Technologies company.
 - e. GCP Applied Technologies Inc. (formerly Grace Construction Products).
 - f. Insulation Solutions, Inc.
 - g. Polyguard Products, Inc.
 - h. Urethane Polymers International, Inc.

- B. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel without Polymeric Film: Composite subsurface drainage panel acceptable to waterproofing manufacturer and consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core, without a polymeric film bonded to the other side; and with a vertical flow rate through the core of 9 to 21 gpm per ft. Insert values.
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. American Hydrotech, Inc.
 - b. BASF Corporation; Construction Systems.
 - c. Carlisle Coatings & Waterproofing Inc.
 - d. CETCO, a Minerals Technologies company.
 - e. Cosella-Dörken Products, Inc.
 - f. GCP Applied Technologies Inc. (formerly Grace Construction Products).
 - g. Insulation Solutions, Inc.
 - h. Polyguard Products, Inc.
 - i. Soprema, Inc.
 - j. Urethane Polymers International, Inc.
 - k. W. R. Meadows, Inc.
- C. Woven-Geotextile-Faced, Molded-Sheet Drainage Panel with Polymeric Film: Composite subsurface drainage panel acceptable to waterproofing manufacturer and consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a woven-geotextile facing with an apparent opening size not exceeding No. 40 sieve, laminated to one side of the core and a polymeric film bonded to the other side; and with a horizontal flow rate through the core of not less than 2.8 gpm per ft. Insert value.
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. GCP Applied Technologies Inc. (formerly Grace Construction Products).
- D. Woven-Geotextile-Faced, Molded-Sheet Drainage Panel without Polymeric Film: Composite subsurface drainage panel acceptable to waterproofing manufacturer and consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a woven-geotextile facing with an apparent opening size not exceeding No. 40 sieve, laminated to one side of the core, without a polymeric film bonded to the other side; and with a horizontal flow rate through the core of not less than 2.8 gpm per ft..
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. American Hydrotech, Inc.
 - b. BASF Corporation; Construction Systems.
 - c. Carlisle Coatings & Waterproofing Inc.

- d. CETCO, a Minerals Technologies company.
 - e. Polyguard Products, Inc.
 - f. Soprema, Inc.
 - g. Urethane Polymers International, Inc.
- E. Molded-Sheet Collector-Panel System with Polymeric Film: Composite subsurface collector-panel system by same manufacturer as primary molded-sheet drainage panels; consisting of a high-profile, studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven-geotextile facing with an apparent opening size not exceeding No. 40 sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate through the core of and a minimum horizontal, in-plane flow rate as indicated on Drawings. Provide system with manufacturer's outlets, connectors, tapes, and other accessories to connect primary molded-sheet drainage panels with piped subdrainage system.
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. GCP Applied Technologies Inc. (formerly Grace Construction Products).
 - b. Insulation Solutions, Inc.
 - c. Polyguard Products, Inc.
- F. Molded-Sheet Collector-Panel System Wrapped with Geotextile: Composite subsurface collector-panel system by same manufacturer as primary molded-sheet drainage panels; consisting of a high-profile, studded, nonbiodegradable, molded-plastic-sheet drainage core; wrapped with a nonwoven-geotextile facing with an apparent opening size not exceeding No. 40 sieve; and with a vertical flow rate through the core of and a minimum horizontal, in-plane flow rate as indicated on Drawings. Provide system with manufacturer's outlets, connectors, tapes, and other accessories to connect primary molded-sheet drainage panels with piped subdrainage system.
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. Carlisle Coatings & Waterproofing Inc.
 - b. CETCO, a Minerals Technologies company.
 - c. W. R. Meadows, Inc.

2.7 INSULATION DRAINAGE PANELS

- A. Insulation: Comply with Section 07 21 00 "Thermal Insulation" for general building insulation, including insulation drainage panels.
- B. Unfaced, Wall-Insulation Type IV, Drainage Panels: Extruded-polystyrene board insulation according to ASTM C 578, Type IV, 25-psi minimum compressive strength; unfaced; fabricated with shiplap or channel edges and with one side having grooved drainage channels.

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. DiversiFoam Products.
 - b. Dow Chemical Company (The).
 - c. Owens Corning.

- C. Unfaced, Wall-Insulation Type VI, Drainage Panels: Extruded-polystyrene board insulation according to ASTM C 578, Type VI, 40-psi minimum compressive strength; unfaced; fabricated with shiplap or channel edges and with one side having grooved drainage channels.
 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. DiversiFoam Products.
 - b. Owens Corning.

- D. Geotextile-Faced, Wall-Insulation Type IV, Drainage Panels: Extruded-polystyrene board insulation according to ASTM C 578, Type IV, 25-psi minimum compressive strength; fabricated with tongue-and-groove edges and with one side having grooved drainage channels faced with nonwoven geotextile filter fabric.
 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. Owens Corning.
 - b. T. Clear Corporation, a subsidiary of Fin Pan Inc.

- E. Geotextile-Faced, Wall-Insulation Type VI, Drainage Panels: Extruded-polystyrene board insulation according to ASTM C 578, Type VI, 40-psi minimum compressive strength; fabricated with tongue-and-groove edges and with one side having grooved drainage channels faced with nonwoven geotextile filter fabric.
 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. T. Clear Corporation, a subsidiary of Fin Pan Inc.

- F. Unfaced, Plaza-Deck Insulation Type VI, Drainage Panels: Extruded-polystyrene board insulation according to ASTM C 578, Type VI, 40-psi minimum compressive strength; unfaced; fabricated with shiplapped, channel, or tongue-and-groove edges and with one side having ribbed drainage channels.
 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. DiversiFoam Products.
 - b. Dow Chemical Company (The).
 - c. Owens Corning.
- G. Unfaced, Plaza-Deck Insulation Type VII, Drainage Panels: Extruded-polystyrene board insulation according to ASTM C 578, Type VII, 60-psi minimum compressive strength; unfaced; fabricated with shiplapped, channel, or tongue-and-groove edges and with one side having ribbed drainage channels.
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. Owens Corning.
- H. Geotextile-Faced, Plaza-Deck Insulation Type VI, Drainage Panels: Extruded-polystyrene board insulation according to ASTM C 578, Type VI, 40-psi minimum compressive strength; fabricated with tongue-and-groove edges, with one side having grooved drainage channels, and faced with manufacturer's standard, nonwoven geotextile filter fabric.
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. T. Clear Corporation, a subsidiary of Fin Pan Inc.
- I. Geotextile-Faced, Plaza-Deck Insulation Type VII, Drainage Panels: Extruded-polystyrene board insulation according to ASTM C 578, Type VII, 60-psi minimum compressive strength; fabricated with tongue-and-groove edges, with one side having grooved drainage channels, and faced with manufacturer's standard, nonwoven geotextile filter fabric.
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. T. Clear Corporation, a subsidiary of Fin Pan Inc.

2.8 PLAZA-DECK PAVERS

- A. Plaza-Deck Pavers: pavers specified in Section 32 14 00 "Unit Paving."
- B. Concrete Plaza-Deck Pavers: Solid, hydraulically pressed, standard-weight concrete units, square edged with top edges beveled 3/16 inch, manufactured for use as plaza-deck pavers; 7500-psi 6500-psi minimum compressive strength, ASTM C 140/C 140M; absorption not greater than 5 percent, ASTM C 140/C 140M; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C 67.

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. Hanover Architectural Products.
 - b. Roofblok Limited.
 - c. Sunny Brook Pressed Concrete Company.
 - d. Wausau Tile Inc.
 - e. Westile Roofing Products.
 2. Regional Materials: Concrete pavers shall be manufactured within 500 miles of Project site from aggregates and cementitious materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
 3. Thickness: 2 inches 2-3/8 inches.
 4. Face Size: 12 inches square 12 by 24 inches 18 inches square 24 inches square As indicated.
 5. Color and Texture: Match Architect's sample.
- C. Paver Pedestals: Paver-support assembly, standard with paver manufacturer as named below, including fixed-height adjustable or stackable pedestals, shims, and spacer tabs for joint spacing of 1/8 inch 3/16 inch 1/8 to 3/16 inch.
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. Envirospec, Inc.
 - b. Hanover Architectural Products.
 - c. Roofblok Limited.
 - d. Sunny Brook Pressed Concrete Company.
 - e. Wausau Tile Inc.
 - f. Westile Roofing Products.
 2. Fill: As recommended in writing by pedestal manufacturer.

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 waterproofing.
1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
 2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D 4263.

3. Verify that compacted subgrade is dry, smooth, sound, and ready to receive waterproofing sheet.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
- E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
1. Install sheet strips of width according to manufacturer's written instructions and center over treated construction and contraction joints and cracks exceeding a width of 1/8 inch for modified bituminous deck-paving waterproofing.
- F. Bridge and cover isolation joints, expansion joints, and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips of widths according to manufacturer's written instructions.
1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.
- G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
1. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:
 - a. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.
 - b. At plaza-deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.
- H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.3 MODIFIED BITUMINOUS SHEET-WATERPROOFING APPLICATION

- A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and per recommendations in ASTM D 6135.
- B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.
 - 1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.
- D. Two-Ply Application: Install sheets to form a membrane with lap widths not less than 50 percent of sheet widths, to provide a minimum of two thicknesses of sheet membrane over areas to receive waterproofing.
- E. Horizontal Application: Apply sheets from low to high points of decks to ensure that laps shed water.
- F. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.
- G. Seal edges of sheet-waterproofing terminations with mastic.
- H. Install sheet-waterproofing and auxiliary materials to tie into adjacent waterproofing.
- I. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.
- J. Immediately install protection course with butted joints over waterproofing membrane.
 - 1. Molded-sheet drainage panels Insulation drainage panels may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.

3.4 MODIFIED BITUMINOUS DECK-PAVING, SHEET-WATERPROOFING APPLICATION

- A. Install modified bituminous deck-paving sheets according to waterproofing manufacturer's written instructions.
- B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

- C. Apply and firmly adhere sheets over areas to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum side-lap widths and 6-inch end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
- D. Apply sheet waterproofing from low to high points of decks to ensure that laps shed water.
- E. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.
- F. Seal edges of sheet-waterproofing terminations with mastic.
- G. Install sheet-waterproofing and auxiliary materials to tie into adjacent waterproofing.
- H. Repair tears, voids, and lapped seams in waterproofing that do not comply with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.

3.5 BLINDSIDE SHEET-WATERPROOFING APPLICATION

- A. Install blindside sheet waterproofing according to manufacturer's written instructions.
- B. Place and secure molded-sheet drainage panels over substrate. Lap edges and ends of geotextile to maintain continuity.
- C. Vertical Applications: Install sheet with face against substrate. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by membrane manufacturer. Overlap and seal seams, and stagger and tape end laps to ensure watertight installation. Mechanically fasten to substrate.
 - 1. Securely fasten top termination of membrane with continuous metal termination bar anchored into substrate and cover with detail tape.
- D. Horizontal Applications: Install sheet with face against substrate. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by membrane manufacturer. Overlap and seal seams, and stagger and tape end laps to ensure watertight installation.
- E. Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail tape.
- F. Seal penetrations through sheet waterproofing to provide watertight seal with detail tape patches or wraps and a liquid-membrane troweling.
- G. Install sheet-waterproofing and auxiliary materials to produce a continuous watertight tie into adjacent waterproofing.
- H. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 6 inches beyond repaired areas in all directions. Apply a patch of sheet waterproofing and firmly secure with detail tape.

3.6 MOLDED-SHEET DRAINAGE-PANEL INSTALLATION

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesive or another method that does not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
 - 1. For vertical applications, install board insulation before installing drainage panels.

3.7 INSULATION DRAINAGE-PANEL INSTALLATION

- A. Install insulation drainage panels over waterproofed surfaces. Cut and fit to within 3/4 inch of projections and penetrations.
- B. Ensure that drainage channels are aligned and free of obstructions.
- C. On vertical surfaces, set insulation drainage panels in adhesive or tape applied according to manufacturer's written instructions.
- D. On horizontal surfaces, loosely lay insulation drainage panels according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.8 PLAZA-DECK PAVER INSTALLATION

- A. Install pavers according to manufacturer's written instructions.
- B. Install paver pedestals and accessories to required elevations. Adjust for final level and slope of paved surfaces.
- C. Loosely lay pavers on pedestals, maintaining a uniform open joint width. Tightly seat pavers against spacers to eliminate lateral movement or drift of paving assembly. Align joint patterns parallel in each direction.
 - 1. Lay out pavers to avoid less-than-half-width pavers at perimeter or other terminations.
- D. Install pavers to vary no more than 1/16 inch in elevation between adjacent pavers and no more than 1/16 inch from surface plane elevation of individual paver.
- E. Limit variation in paving installation to within 1/4 inch in 10 feet of surface plane in any direction; noncumulative.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests.

- B. Manufacturer's Field Service: Engage a full-time site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components; and to furnish daily reports to Architect.
- C. Waterproofing will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.10 PROTECTION, REPAIR, AND CLEANING

- A. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- E. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

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SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Low-emitting product certification.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- B. Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.4 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing protocol required to achieve UL Classified rating. Identify products with appropriate markings of Underwriters Laboratories.
- B. Formaldehyde-Free: Third Party Certified with UL Environmental Validation.
- C. Bio Soluble: As determined by research conducted by the International Agency for Research on Cancer (IARC) and supported by revised reports from the National Toxicology Program (NTP), and the California Office of Environmental Health Hazard Assessment. Certified by European Certification Board for Mineral Wood Products (EUCEB).
- D. Recycled Content: A minimum of 50 (or highest available) percent post-consumer recycled glass content, UL-validated.
- E. Low-Emitting Materials: For all thermal and acoustical applications of glassinsulation products, provide materials complying with the testing and products requirements of UL Environmental Validation and UL GreenGuard Gold certification.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
 - 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
 - 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD (XPS)

- A. Manufacturers: Subject to compliance with requirements, product products by one of the following:
 - 1. DiversiFoam Products.
 - 2. Dow Chemical Company (The).
 - 3. Owens Corning.

2.2 INSULATION FASTENERS

- A. Manufacturers: Subject to compliance with requirements, product products by one of the following:
 - 1. AGM Industries, Inc.
 - 2. Gemco.
 - 3. Rodenhouse, Inc.
- B. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.
 - 1. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
 - 2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation.
- C. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.

1. Angle: Formed from 0.030-inch- (0.762-mm-) thick, perforated, galvanized carbon-steel sheet with each leg 2 inches (50 mm) square.
 2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation.
- D. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of [1 inch (25 mm)] [2 inches (50 mm)] [3 inches (76 mm)] between face of insulation and substrate to which anchor is attached.
- E. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.
- F. Insulated sheathing manufacturer's recommended polymer or other corrosion protective coated steel screw fasteners for anchoring sheathing to metal wall framing. Fastener length and size based on wall sheathing thickness.

2.3 ACCESSORIES

- A. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF CONTINUOUS INSULATION

- A. Install insulation in accordance with manufacturer's recommendations. Fasten to exterior face of exterior metal stud wall framing or cmu wall using sheathing manufacturer's recommended type and length screw fasteners with washers. Abut panels tightly together and around openings and penetrations.

3.4 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

SECTION 074213.13 - FORMED METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes formed metal wall panels for the following applications:

1. Exterior wall systems, over sheathing and air barrier, and framing
2. Metal access panel/door.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for metal panel assembly during and after installation.
8. Review of procedures for repair of metal panels damaged after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

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 each type of panel and accessory.

- B. Deferred Submittal (Delegated-Design): For formed metal wall panel systems indicated to comply with performance requirements and design criteria, submit copies of structural calculations indicating complete compliance with the specified performance requirements. Calculations shall be prepared, signed and sealed by a Professional Engineer registered in the state of Nevada.
 - 1. Architect and consultants' review of the Deferred Submittal Shop Drawings and calculations is limited to confirmation that the work described in them is in general conformance to the design of the building.
- C. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches (1:10).
- D. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below:
 - 1. Metal Panels: 12 inches (305 mm) long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels 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.
- B. 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 mockup of typical metal panel assembly as shown on Drawings, including corner, supports, attachments, and accessories.

2. Water-Spray Test: Conduct water-spray test of metal panel assembly mockup, testing for water penetration according to AAMA 501.2.
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.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

1.8 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems 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's standard form in which manufacturer agrees to repair finish or replace metal 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 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - 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 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design formed metal wall panel systems, including subframing and supports, using performance requirements and design criteria indicated. Provide comprehensive engineering analysis by a qualified professional engineer. Prepare Deferred Submittal calculations and Shop Drawings for review by authorities having jurisdiction.
- B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
 3. Deflection Limits: For wind loads, no greater than $1/240$ of the span.
- C. Air Infiltration (Exterior Wall Assemblies): Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E283 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- D. Water Penetration under Static Pressure (Exterior Wall Assemblies): No water penetration when tested according to ASTM E331 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).

- 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.

2.2 CONCEALED-FASTENER METAL WALL PANELS

- A. Provide factory-formed metal 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 and factory-applied sealant in side laps. Include accessories required for weathertight installation.
 - 1. Basis of Design products are scheduled on Drawings.
- B. Flush-Profile, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and a flat pan between panel edges; with flush joint between panels.
 - 1. Manufacturers: Subject to compliance with requirements, provide Basis of Design products or comparable product by one of the following:
 - a. AEP Span; A BlueScope Steel Company.
 - b. Alcoa Architectural Products (USA).
 - c. Berridge Manufacturing Company.
 - d. CENTRIA Architectural Systems.
 - e. Fabral.
 - f. Jarden Zinc Products.
 - g. MBCI.
 - h. Morin - A Kingspan Group Company.
 - i. PAC-CLAD; Petersen Aluminum Corporation.
 - 2. Aluminum Sheet: Coil-coated sheet, ASTM B209 (ASTM B209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - a. Thickness: 0.125 inch
 - b. Surface: Smooth, flat finish.
 - c. Exterior Finish: Three-coat fluoropolymer.
 - d. Color: As indicated by manufacturer's designations.
 - 3. Panel Coverage: As scheduled on Drawings.
 - 4. Panel Height: As scheduled on Drawings.

2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal 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 panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
1. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 2. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.
- F. Door seal: Continuous door bottom aluminum extrusion with continuous nylon brush pile sweep; sweep shall be field cut to length required to have positive contact with threshold without binding door.
1. 90137CP; Pemko.
 2. C390MIL; Sealeze.
- G. Invisible Hinges Products and Manufacturers:

1. Full mortised, invisible "Soss" type hinges as manufactured by Universal Industrial Products Company and specifically manufactured for door thickness indicated and fabricated from high strength plated steel, heavy duty zinc alloy castings, and non-removable riveted hinge pins. Each hinge shall be engineered for smooth performance with laminated link construction supplemented by anti-friction materials that reduce friction for smooth, free hinge operation. Complying with BHMA A156.9, B01501.
 - a. Hinge Quantity: Provide hinge quantity as recommended by hinge manufacturer based on door width, weight, thickness, door material, and hinge cup selection.
 2. Full mortised, invisible type hinges and specifically manufactured for door thickness indicated and fabricated from steel, and non-removable pins. Each hinge shall be engineered for smooth performance with maintenance free slide bearing construction supplemented by anti-friction materials that reduce friction for smooth, free hinge operation, adjustable in 3 dimensions, UL Listed for 20 minute fire doors.
 - a. Hinge Quantity: Provide hinge quantity as recommended by hinge manufacturer based on door width, weight, thickness, door material.
 - b. One of the following:
 - 1) Tectus TE 527 3D; Simonswerk.
 - 2) RY-120 Concealed Hinges; RocYork.
- H. Mortise Lock and Latch Sets: Heavy duty, commercial, mortise bodies complying with BHMA A156.13 Series 1000, Grade 1, with throughbolted lever trim. Furnish mortise type, field reversible without disassembly, field multifunctional without opening lock cases, lock and latch sets with 1 or 2 piece anti-friction deadlocking stainless steel latchbolts having a minimum 3/4 inch (19 mm) throw, 2-3/4 inches (70 mm) backset, and UL listed for 3 hour doors. All lock and latch sets, to be furnished complete with heavy 0.109 inch (2.77 mm) (12 gage) wrought steel zinc dichromate or chrome plated case, trim, adjustable beveled square cornered armored fronts, cold forged steel or stainless steel hubs, and 6 pin cylinders. Conceal fastenings, washers and bushings. Provide wrought, or black plastic, box strikes for each lock and latch set. Provide brass, bronze or stainless steel strikes with curved lips of sufficient length to protect frames. Provide solid forged or cast levers with wrought roses. Where lock functions are scheduled provide non-handed guard bolt and stainless steel deadbolt with a minimum 1 inch (25 mm) throw. Where electro-mechanical locksets are scheduled provide transformers properly sized for conversion of power supply to the power characteristics of the electromechanical locksets. Where electro-mechanical locksets are scheduled provide request to exit (REX) monitoring feature
- 2.4 FABRICATION
- A. Fabricate and finish metal panels and accessories at the factory, 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. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to 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. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal 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.

2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- 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 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.
- C. Aluminum Panels and Accessories:
 - 1. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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 for seacoast and severe environments.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the 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.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.3 INSTALLATION

- A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal 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 panels.
 - 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Install flashing and trim as metal panel work proceeds.
 - 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.

7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
1. Aluminum 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.
 2. Stainless Steel Panels: Use stainless steel fasteners.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Rainscreen-Principle Installation: Install using manufacturer's standard assembly with vertical channel that provides support and secondary drainage assembly, draining at base of wall. Notch vertical channel to receive support pins. Install vertical channels supported by channel brackets or adjuster angles and at locations, spacings, and with fasteners recommended by manufacturer. Attach metal material wall panels by inserting horizontal support pins into notches in vertical channels and into flanges of panels. Leave horizontal and vertical joints with open reveal
1. Install wall panels to allow individual panels to be installed and removed without disturbing adjacent panels.
 2. Do not apply sealants to joints unless otherwise indicated
- E. Accessory Installation: 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 panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
- F. 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 are permanently watertight.
1. Install exposed flashing and trim that is without 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 achieve waterproof 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 (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Water-Spray Test: After installation, test area of assembly shown on Drawings for water penetration according to AAMA 501.2.
- C. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.
- D. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- E. Prepare test and inspection reports.

3.5 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 075419 - POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Adhered polyvinyl chloride (PVC) roofing system.
2. Roof insulation.
3. Cover board.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking; and for wood-based, structural-use roof deck panels.
2. Section 061600 "Sheathing" for wood-based, structural-use roof deck panels.
3. Section 072100 "Thermal Insulation" for insulation beneath the roof deck.
4. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
5. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.2 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For insulation and roof system component fasteners, include copy of SPRI's Directory of Roof Assemblies listing.

B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness of insulation.
2. Base flashings and membrane terminations.
3. Flashing details at penetrations.
4. Tapered insulation thickness and slopes.
5. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
6. Tie-in with air barrier.

C. Samples for Verification: For the following products:

1. Roof membrane and flashing, of color required.

D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.4 INFORMATIONAL SUBMITTALS

A. 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 compliance 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.

B. Product Test Reports: For roof membrane and insulation, tests performed by independent qualified testing agency indicating compliance with specified requirements.

C. Evaluation Reports: For components of roofing system, from ICC-ES.

D. Statement of Application: In addition to other specified reports and certificates, submit a statement signed by Contractor and Roofing Subcontractor, stating that the primers, roofing, flashing, roof insulation comply with these Specifications, and that the examination, substrate preparation and installation methods complied with the manufacturer's printed instructions and were proper and adequate for the condition of installation and use.

E. Field Test Reports:

1. Concrete internal relative humidity test reports.

2. Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

B. Certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for roofing system identical to that used for this Project.

- B. 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.

1.7 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.

1.8 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed in accordance with manufacturer's written instructions and warranty requirements.

1.9 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, and walkway products, 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 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. Roof system and flashings shall remain watertight.
 - 1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested in accordance with ASTM G152, ASTM G154, or ASTM G155.
 - 2. Impact Resistance: Roof membrane shall resist impact damage when tested in accordance with ASTM D3746, ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.
 - 3. Puncture Resistance: Roofing system shall resist puncture damage when tested in accordance with ASTM D5602 or ASTM D5635.
- 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 indicated on structural Drawings when tested in accordance with FM Approvals 4474, UL 580, or UL 1897.
- D. ENERGY STAR Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low -slope roof products.
- E. Energy Performance: Roofing system shall have an initial solar reflectance of not less than 0.70 and an emissivity of not less than 0.75 when tested in accordance with CRRC-1.
- F. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.2 POLYVINYL CHLORIDE (PVC) ROOFING

- A. PVC Sheet: ASTM D4434/D4434M, Type III, fabric reinforced.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Carlisle SynTec Incorporated; Sure-Flex Polyester Reinforced PVC or comparable product by one of the following:
 - a. GAF.
 - b. Johns Manville; a Berkshire Hathaway company.

- c. Sika Sarnafil.
 - 2. Thickness: 80 mills (2.0 mm).
 - 3. Exposed Face Color: White.
- B. 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. Adhesives and Sealants: Comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet.
- C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.
- D. Bonding Adhesive: Manufacturer's standard, water based.
- 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 roofing components to substrate, and acceptable to roofing system manufacturer.
- H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.4 SUBSTRATE BOARDS

- A. Substrate Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum substrate or ASTM C1278/C1278M, fiber-reinforced gypsum board.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Georgia-Pacific Gypsum LLC.
 - c. National Gypsum Company.

- d. USG Corporation.
- e. Insert manufacturer's name.
- 2. Thickness: 1/2 inch (13 mm).
- 3. Surface Finish: Unprimed.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

2.5 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by PVC roof membrane manufacturer.
- B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Carlisle SynTec Incorporated; InsulBase Polyiso or comparable product by one of the following:
 - a. Atlas EPS; a Division of Atlas Roofing Corporation.
 - b. Atlas Roofing Corporation.
 - c. Dyplast Products.
 - d. Firestone Building Products.
 - e. Flex Membrane International Corp.
 - f. GAF.
 - g. Hunter Panels.
 - h. Insulfoam; Carlisle Construction Materials Company.
 - i. Johns Manville; a Berkshire Hathaway company.
 - j. Rmax, Inc.
 - 2. Compressive Strength: 24 psi (172kPa).
 - 3. Size: 48 by 48 inches (1219 by 1219 mm).
 - 4. Thickness:
 - a. Base Layer: 1-1/2 inches (38 mm).

2.6 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.
- D. Cover Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum board or ASTM C1278/C1278M fiber-reinforced gypsum board.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Georgia-Pacific Gypsum LLC.
 - b. National Gypsum Company.
 - c. USG Corporation.
 - 2. Thickness: 1/2 inch (13 mm).
 - 3. Surface Finish: Unprimed.

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.
- 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 in accordance with 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.
- C. Perform fastener-pullout tests in accordance with roof system manufacturer's written instructions.
 - 1. Submit test result within 24 hours of performing tests.

- a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.
- D. Install sound-absorbing insulation strips in accordance with acoustical roof deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOFING, GENERAL

- A. Install roofing system in accordance with roofing system manufacturer's written instructions, SPRI's Directory of Roof Assemblies listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.
- B. 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.
- C. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified under Section 072726 "Fluid-Applied Membrane Air Barriers."

3.4 INSTALLATION OF SUBSTRATE BOARD

- A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches (610 mm) in adjacent rows.
 - 1. Tightly butt substrate boards together.
 - 2. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.

3.5 INSTALLATION OF VAPOR RETARDER

- A. Laminate Sheet: Loosely lay laminate-sheet vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of 2 and 6 inches (50 and 150 mm), respectively.
 - 1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
 - 2. Continuously seal side and end laps with tape.
- B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.6 INSTALLATION OF INSULATION

- 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 Wood Panel Decking:
 - 1. Install base layer of insulation with joints staggered not less than 24 inches (610 mm) in adjacent rows.
 - a. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
 - 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 and substrate board using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to wood panel decks.
 - 1) Fasten insulation in accordance with requirements in SPRI's Directory of Roof Assemblies for specified Wind Uplift Load Capacity.
 - 2) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.
 - 2. Install upper layers of 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. Install with long joints continuous and with end joints staggered not less than 12 inches (305 mm) in adjacent rows.
 - c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - d. Make joints between adjacent insulation boards not more than 1/4 inch (6 mm) in width.

- e. 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.
- 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. Adhere each layer of insulation to substrate using adhesive in accordance with SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
 - 1) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

3.7 INSTALLATION OF COVER BOARDS

- A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches (150 mm) in each direction.
 - 1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - 2. At internal roof drains, conform to slope of drain sump.
 - a. Trim cover board so that water flow is unrestricted.
 - 3. Cut and fit cover board tight to nailers, projections, and penetrations.
 - 4. Adhere cover board to substrate using adhesive in accordance with SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
 - a. Set cover board in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

3.8 INSTALLATION OF ADHERED ROOF MEMBRANE

- A. Adhere roof membrane over area to receive roofing in accordance with roofing system manufacturer's written instructions.
- B. Unroll roof membrane and allow to relax before installing.
- C. Start installation of roofing in presence of roofing system manufacturer's technical personnel Owner's testing and inspection agency.
- 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 perimeter of roofing.
- G. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- H. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roof membrane and sheet flashings to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
 - 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- I. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.9 INSTALLATION OF BASE FLASHING

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates in accordance with roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will 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. Owner will engage a qualified testing agency to perform the following tests:

1. Low-Voltage Electrical Conductance Testing: Testing agency shall survey entire roof area and flashings to locate discontinuity in the roof membrane using an exposed metal electrical loop to create an electrical field tested with handheld probes or a scanning platform with integral perimeter electrical loops creating a complete electrical field.
 - a. Perform tests before overlying construction is placed.
 - b. After testing, repair areas of discontinuities, repeat tests, and make further repairs until roofing and flashing installations are contiguous.
 - 1) Cost of retesting is Contractor's responsibility.
 - c. Testing agency shall prepare survey report indicating locations of initial discontinuities, if any.
- C. 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.
- D. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.11 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, 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 in accordance with warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Formed roof drainage system.
2. Formed low-slope roof flashing and trim.
3. Formed wall flashing and trim.

B. Single Subcontract Responsibility: Refer to roofing sections for the requirements of single subcontract responsibilities for sheet metal flashing and trim.

1.2 ACTION SUBMITTALS

A. Product Data: Submit product data for each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Submit shop drawings showing layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:

1. Identify material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
4. Details of expansion-joint covers, including showing direction of expansion and contraction.

C. Samples: Submit 8 inches x 8 inches (200 x 200 mm) square samples of sheet metal flashing, in the specified finish.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Subcontract the sheet metal flashing and trim work to a firm which is specialized in the fabrication and installation of sheet metal flashing and trim and who has successfully installed work similar in design and extent to that required for the project, in not less than three projects of similar scope to the satisfaction of the Architect, and whose work has resulted in construction with a record of successful in-service performance for a period of 5 years. .

- B. Sheet Metal Flashing and Trim Reference Standards: Comply with the industry standard sources below. Where sheet metal flashing and trim work details have not been specifically detailed on the drawings or specified the Contractor shall submit, for the Architect's approval, proposed sheet metal detailing. The primary source for proposed sheet metal detailing shall come from the industry standard sources below.
 - 1. SMACNA's Architectural Sheet Metal Manual.
 - 2. NRCA's Roofing and Waterproofing Manual.
 - 3. ANSI/SPRI ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roof Systems except where the Performance Requirements are more stringent.
- C. Sealant Compatibility and Adhesion Testing: Use sealant manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
- D. Design Modifications: Submit design modifications necessary to meet the performance requirements and field coordination. Variations in details or materials which do not adversely affect the appearance, durability or strength of components shall be submitted to the Architect for review. Maintain the general design concept without altering size of members, profiles and alignment.

1.4 COORDINATION

- A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

1.5 WARRANTY

- A. Furnish written warranty against water leakage resulting from defects of materials or workmanship. Upon notification of such defects, within the warranty period, make the necessary repairs and replacements at the convenience of, and no cost to, the Owner. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.
 - 1. Warranty period shall be 5 years after the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Fabricate and install exterior wall and roofing sheet metal flashing and trim capable of resisting the wind forces greater than or equal to those shown on Structural Drawings for components and cladding.

- C. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:
 - 1. Design Pressure: As indicated on Drawings.
- D. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from surface temperatures ranging from +10 degrees F. to +180 degrees F., without buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements.
 - 1. Dimensions shown on Drawings are based on an assumed design temperature of +70oF (+21 deg C). Fabrication and installation procedures shall take into account the ambient temperature range at the time of the respective operations.
- E. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

2.2 SHEET METALS

- A. Copper Sheet: ASTM B 370, Temper H00 or H01, cold-rolled copper sheet.
- B. Lead-Coated Copper Sheet: ASTM B 101, Temper H00 and H01, cold-rolled copper sheet, of weight (thickness) indicated below, coated both sides with lead weighing not less than 12 lbs./100 sq. ft. (0.59 kg/sq. m) nor more than 15 lbs./100 sq. ft. (0.73 kg/sq. m) of copper sheet (total weight of lead applied equally to both sides).
- C. Aluminum Sheet: ASTM B 209 (ASTM B 209M), Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, finished as follows:
 - 1. Mill Finish: Standard one-side bright.
 - 2. Alclad Finish: Metallurgically bonded surfacing to both sides.
 - 3. Factory Prime Coating: Factory-applied, baked-on epoxy primer coat.
 - 4. Siliconized-Polyester Coating: Epoxy primer and silicone-modified, polyester-enamel topcoat.
 - a. Color: As selected by Architect from manufacturer's full range.
 - 5. High-Performance Organic Finish: Three-coat, thermocured system containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604.
 - a. Color: As selected by Architect from manufacturer's full range.
- D. Zinc-Tin Alloy-Coated Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead-soft, fully annealed stainless-steel sheet, coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin).

- E. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality, mill phosphatized for field painting.
- F. Prepainted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.
 - 2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality.
 - 3. Exposed Finishes: Apply the following coil coating:
 - a. Factory Prime Coating: Factory-applied, baked-on epoxy primer coat.
 - b. Siliconized-Polyester Coating: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.
 - 1) Color: As selected by Architect from manufacturer's full range.
 - c. High-Performance Organic Finish: Three-coat thermocured system containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2604, except as modified for below:
 - 1) Humidity and Salt Spray Resistance: 2000 hours.
 - 2) Color: As selected by Architect from manufacturer's full range.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.
- B. Underlayment: Self-Adhering, High-Temperature Sheet: 0.76 mm thick, self adhering, self sealing, underlayment consisting of slip-resisting high density cross laminated polyethylene-film top surface laminated to layer of butyl rubber based adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: Stable after testing at 116 deg C 116 deg C; ASTM D 1970.
 - 2. Product Reference: Grace, W. R. & Co.; Ultra.
- C. Fasteners: Wood screws, same metal as flashing/sheet metal, annular threaded nails, self-tapping screws, and other suitable fasteners designed to withstand design loads.
- D. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer, use a noncorrosive rosin flux over tinned surfaces.

- E. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- F. Elastomeric Sealant: ASTM C 920 and Section 079200 "Joint Sealants," elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- G. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
- H. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound.
- I. Bituminous Coating: Cold-applied bituminous paint complying with ASTM D 1187, compounded for 15 mil (0.4 mm) dry film thickness per coat.
- J. Wood Nailer Strips: Provide wood nailer strips, fabricated to sizes indicated, from lumber complying with the requirements of Section 061053 "Miscellaneous Rough Carpentry" and fire retardant treated by pressure process using chemical solution which is non-hygroscopic and non-corrosive to sheet metal used.

2.4 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with the referenced standards that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.
- B. Fabricate sheet metal flashing and trim in thickness needed to comply with performance requirements, but not less than that specified for each application and metal.
- C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
- E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.

- F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
- G. Fabricate cleats and attachment devices from same material as accessory being anchored. Cleats shall be 2 inches (50 mm) wide by nominal 3 inches (75 mm) long typically, minimum 0.0187 inch (0.5 mm) thick, punch for minimum 2 nail or screw holes. One end shall be locked into seams, or into folded edge of sheet metal sheets, the other end shall be secured with nails or screws and folded back over nail or screw heads.

2.5 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing (Gravel Stop) and Fascia Caps: Fabricate in minimum 96 inch (2400 mm) long, but not exceeding 10 foot (3 m) long, sections. Furnish with 6 inch (150 mm) wide joint cover plates.
 - 1. Fabricate scuppers from the following material:
 - a. Prepainted, Metallic-Coated Steel: 0.0276 inch (0.7 mm) thick.
- B. Copings: Fabricate in minimum 96 inches (2400 mm) long, but not exceeding 10 foot (3 m) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder watertight.
 - 1. Joint Style: Butt, with 6-inch- (150-mm-) wide exposed cover plates.
 - 2. Fabricate copings from the following material:
 - a. Prepainted, Metallic-Coated Steel: 0.0396 inch (1.0 mm) thick.
- C. Roof to Sheet Metal Roof Edging Transition Expansion-Joint Cover: Fabricate from the following material:
 - 1. Prepainted, Metallic-Coated Steel: 0.0336 inch (0.85 mm) thick.
- D. Base Flashing: Fabricate from the following material:
 - 1. Prepainted, Metallic-Coated Steel: 0.0276 inch (0.7 mm) thick.
- E. Counterflashing: Fabricate from the following material:
 - 1. Prepainted, Metallic-Coated Steel: 0.0217 inch (0.55 mm) thick.
- F. Roof-Penetration Flashing: Fabricate from the following material:
 - 1. Prepainted, Metallic-Coated Steel: 0.0276 inch (0.7 mm) thick.
- G. Roof-Drain Flashing: Fabricate from the following material:
 - 1. Zinc-Tin Alloy-Coated Stainless Steel: 0.015 inch (0.4 mm) thick.

2.6 WALL SHEET METAL FABRICATIONS

- A. Openings Flashing in Frame Construction: Fabricate through wall head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high end dams. Fabricate from the following material:
1. Prepainted, Metallic-Coated Steel: 0.0217 inch (0.55 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
1. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Nailer and Underlayment Installation for Copings:
1. Provide wood nailers shown to properly install the coping. Form to shapes indicated and cut as required for true line and level of attached work. Set to required levels and lines. Allow approximately 1/8" between nailer ends and offset joints a minimum of 12" in multiple layers. Locate nailers to comply with requirements for attaching other construction.
 2. Utilize mechanical fasteners that will have no detrimental effect on the components of the coping. Recess fasteners flush with surfaces. Fasten in accordance with FM 1-49 standards and the coping manufacturers recommendations.
 3. Underlayment Installation: Install a course of self adhering high temperature sheet underlayment directly over nailers in accordance with the underlayment manufacturers instructions to the extent indicated on the drawings. Lap ends of underlayment lengths a minimum of 4 inches.

- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
 - 1. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of underlayment.
 - 2. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.
- D. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
- E. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, and butyl sealant.
- F. 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.
 - 1. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
- G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
 - 1. Galvanized or Prepainted, Metallic-Coated Steel: Use stainless-steel fasteners.
 - 2. Aluminum: Use aluminum or stainless-steel fasteners.
- H. Seal joints with butyl sealant as required for watertight construction.
 - 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to the referenced standards and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Downspouts: Join sections with 1-1/2 inch (38 mm) telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1500 mm) o.c. in between.
- C. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal roof flashing and trim to comply with performance requirements and the referenced standards. Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to ANSI/SPRI ES-1 to comply with the performance requirements.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49.
 - 1. Interlock exterior bottom edge of coping with continuous cleats anchored to substrate at 16 inch (400 mm) centers.
 - 2. Anchor interior leg of coping with screw fasteners and washers at 18 inch (450 mm) centers.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Secure in a waterproof manner. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with butyl sealant.
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:
 - 1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
 - 2. Seal with butyl sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

3.5 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Openings Flashing in Frame Construction: Install continuous through wall head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

3.6 MISCELLANEOUS SHEET METAL FABRICATION INSTALLATION

- A. Overhead-Piping Safety Pans: Suspend pans from pipe and install drain line to plumbing waste or drain line.
- B. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Seal flashing with elastomeric sealant to equipment support member.

3.7 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces for uniform oxidation and weather exposure; neutralize flux materials; clean off excess solder and sealants; and remove strippable films, if any.
- B. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, and pieces of flashing. Maintain in a clean condition during construction.
- C. 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

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes sealants for the following applications:
1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:
 - a. Joints in GFRC.
 - b. Joints between metal panels.
 - c. Joints between different materials listed above.
 - d. Perimeter joints between materials listed above and frames of doors and windows and louvers.
 - e. Other joints as indicated.
 2. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
 - a. Perimeter joints of exterior openings where indicated.
 - b. Other joints as indicated.

1.2 ACTION SUBMITTALS

- A. Product Data: Submit product data for each joint-sealant product indicated and the following:
1. Written certification from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for the use(s) indicated as verified through manufacturer's in-house testing laboratory.
 - a. Complete instructions for handling, storage, mixing, priming, installation, curing and protection of each type of sealant.
- B. Samples: Submit samples of each type and color of exposed joint sealant required. Provide fully cured joint sealant samples in 3/4 inch (19 mm) wide joints 12 inches (300 mm) long formed between two strips of material to be sealed as they will appear on the Project.

1.3 INFORMATIONAL SUBMITTALS

- A. Warranties: Submit specified warranties.

1.4 QUALITY ASSURANCE

- A. **Installer Qualifications:** Exposed sealant work including, but not limited to, sealants used for air and weatherseals which are external to GFRC shall be performed by one firm specializing in the installation of sealants who has successfully produced work comparable to this Project, in not less than three projects of similar scope to the satisfaction of the Architect, and whose work has resulted in construction with a record of successful in-service performance for a period of 10 years. Concealed sealant work (sealants which are internal to metal panels, necessary for air and moisture penetration resistance under applied loads) shall be the responsibility of the subcontractor responsible for the final design, installation, and performance of the respective system.
- B. **Source Limitations:** Obtain each type of joint sealant, and each type of structural silicone adhesive, from a single manufacturer.
- C. **Mockups and Sample Installations:** Provide mockups and sample installations of sealants at locations indicated or required by the Architect. Mockups and sample installations shall represent the primary types of materials, substrate surfaces, joint size, exposure, and other conditions to be encountered in the work. Preparation, priming, application, and curing, shall comply with manufacturer's recommendations and actual proposed methods. Schedule the applications, with allowance for sufficient curing time, so that samples may be examined and necessary adjustments made at least one week prior to date scheduled for commencing installation of the work.
 - 1. The mockups and sample installations shall be visually examined for staining, dirt pickup, shrinkage, color, general workmanship and appearance. Cut and pull the sealant from each sample joint to examine for internal bubbles or voids, adhesion, and general compatibility with substrate.
 - 2. Mockups and sample installations are required in conjunction with the following:
 - a. Section 034900 "Glass-Fiber Reinforced Concrete (GFRC)."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 FIELD CONDITIONS

- A. **Environmental Limitations:** 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 (4.4 deg C).

2. When joint substrates are wet.
- B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 WARRANTY

- A. Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealant work which has failed to provide a weathertight system within specified warranty period.
 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranties: Written warranties (weatherseal and stain resistance), signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that fail to provide airtight and watertight joints, or fail in adhesion, cohesion, abrasion-resistance, stain-resistance, weather resistance, or general durability or appear to deteriorate in any other manner not clearly specified in the manufacturer's data as an inherent quality of the material within specified warranty period.
 1. Warranty Period:
 - a. For Polyurethane Sealants: 5 years from date of Substantial Completion.
 - b. For Silicone Sealants: 20 years from date of Substantial Completion.

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 stated by sealant manufacturer's published data, and as substantiated by the manufacturer for each application through testing.
- B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 1. Architectural Sealants: Not more than 250 g/L.
 2. Nonmembrane Roof Sealants: 300 g/L.
 3. Single-Ply Roof Membrane Sealants: 450 g/L.
 4. Sealant Primers for Nonporous Substrates: Not more than 250 g/L.
 5. Sealant Primers for Porous Substrates: Not more than 775 g/L.

- C. Low-Emitting Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Colors: For fully concealed joints, provide manufacturer's standard color of sealant which has the best overall performance characteristics for the application shown. For exposed joints provide custom colors to match Architect's samples of the following:
 - 1. Metal panels, each color.
 - 2. GFRC.
 - 3. Other exterior and interior materials, each color as indicated.
- E. Manufacturer's Representative: Do not use elastomeric sealant produced by a manufacturer who will not agree to send a qualified technical representative to the Project site when requested, for the purpose of rendering advice concerning the proper installation of manufacturer's materials.

2.2 ELASTOMERIC JOINT SEALANTS

- A. Silicone Sealants for Vertical Applications (Non-Sag):
 - 1. Typical Exterior Wall Joints:
 - a. Properties:
 - 1) Standards: Comply with ASTM C 920, Type M or S, Grade NS, Class 25 or 50; use NT, M, A and O.
 - 2) Performance: Non-stain, non-bleed, non-streaking to sealed and adjacent substrates. The minimum peel adhesion value after 7 day immersion shall not be less than 13 pli (2.27 kN/m) when tested in strict accordance with ASTM C 794 Adhesion in Peel.
 - 3) Cure System and Oil Content: Neutral-cure, low or medium modulus system specifically manufactured with controlled oil content to eliminate oil migration into sealed substrates and residue rundown over and onto adjacent substrates.
 - b. Products and Manufacturers: One of the following:
 - 1) DOWSIL 756 SMS; Dow Chemical Company.
 - 2) Spectrem 3 or Spectrem 4-TS (Use Spectrem 1 for metal to metal joints); Tremco, an RPM Co.
 - 3) Silpruf NB SCS 9000 (use Silpruf SCS 2000 for metal to metal joints); Momentive.
 - 4) 890 NST; Pecora.
- B. Two Part Polyurethane Sealants for Vertical Applications (Non-Sag):
 - 1. Typical Exterior Wall Joints (Two-Part Polyurethane Sealants):

- a. Properties:
 - 1) Standards: Comply with ASTM C 920, Type M, Grade NS, Class 25 or Class 50; use NT, M, A and O.
 - 2) Performance: Non-stain, non-bleed, non-streaking to sealed and adjacent substrates. The minimum peel adhesion value after 7 day immersion shall not be less than 13 pli (2.27 kN/m) when tested in strict accordance with ASTM C 794 Adhesion in Peel.
- b. Products and Manufacturers: One of the following:
 - 1) MBCC Group Master Builders Solutions (formally BASF); MasterSeal NP 2.
 - 2) Pecora Corporation; Dynatrol II.
 - 3) Tremco an RPM Co.; 240FC.

2.3 LATEX JOINT SEALANTS

- A. Latex Sealant: Non-elastomeric, one part, non-sag, paintable latex sealant that is recommended for exposed applications on the interior. Complying with ASTM C 834, Type OP (opaque sealants):
 1. Products: Provide one of the following:
 - a. Pecora Corporation; AC-20 + Silicone.
 - b. DAP Products Inc.; Alex Plus Acrylic Latex Caulk Plus Silicone.
 - c. MBCC Group Master Builders Solutions (formally BASF); MasterSeal NP 520.
 - d. Tremco, an RPM Co.; Tremflex 834.

2.4 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type 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: One of the following preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding backings of flexible plastic foam complying with ASTM C 1330, and of type indicated below. Select shape and density of cylindrical sealant backings in consultation with the manufacturer for proper performance in specific condition of use in each case.
 1. Type C: Closed-cell polyethylene foam material with a surface skin, which is nonabsorbent to liquid water and gas, non-outgassing in unruptured state; one of the following:
 - a. HBR Closed Cell Backer Rod; Nomaco, Inc.

- b. MasterSeal 920; MBCC Group Master Builders Solutions (formally BASF).
 - c. Mile High Foam; Backer Rod Mfg., Inc.
2. Type B: Bi-cellular reticulated, polymeric foam material with a surface skin, nonoutgassing, with a density of between 1.5-3.0 pcf (24-48 kg/cubic meter) per ASTM D 1622 and minimum tensile strength of greater than 29-38 psi (200-267 kPa) per ASTM D 1623, and with water absorption less than 0.058 oz./cubic inch (0.10 gm/cc) per ASTM C 1016; one of the following:
- a. SOFROD; Nomaco, Inc.
 - b. MasterSeal 921; MBCC Group Master Builders Solutions (formally BASF).
 - c. Titan Foam; Backer Rod Mfg., Inc.
- C. Bond-Breaker Tape: Polyethylene, TFE fluorocarbon, 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 where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.
- D. Weep and Vent Tubes: Clear plastic (PVC) tubing, minimum 1/4 inch (6.35 mm) inside diameter, and of length as required to extend between exterior face of sealant and open cavity behind.
- 1. At window and curtain wall systems, where required by system designer, provide gutter termination of tube with preformed nipples suitable for sealing to gutter.
- E. Cork Joint Filler: Resilient and nonextruding, ASTM D 1752, Type II.
- 2.5 MISCELLANEOUS MATERIALS
- A. Primer: Material recommended, as verified through compatibility and adhesion testing, by joint sealant manufacturer for the substrates indicated to be sealed.
 - 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 with joint substrates.
 - C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and which will not stain nor mar the finish of surfaces adjacent to joints to which it is applied.

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. 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 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), existing joint sealants, existing backer rods, existing waterproofing materials, existing water repellent treatments, oil, grease, water, surface dirt, and frost.
 - 2. Clean concrete, masonry, unglazed surfaces of tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, 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 from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean metal, glass, porcelain enamel, glazed surfaces of tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming (Elastomeric Sealants Only): Prime joint substrates with primers selected through the preconstruction compatibility and adhesion testing. 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. Joint Priming (Elastomeric Sealants Only): Prime joint substrates where recommended in writing by joint sealant manufacturer, based on prior testing and 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 beyond bond areas or onto adjoining surfaces.
- D. 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 and primer 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.
1. Silicone Glazing Sealants: Refer to Section 088000 "Glazing" for installation.
- 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. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
1. Install sealant backings of type 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.
 - a. Do not leave gaps between ends of sealant backings. Trim for tight fit around obstructions or elements penetrating the joint.
 - b. Do not stretch, twist, puncture, or tear sealant backings.
 - c. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry sealant backings.
 2. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.
 3. Install weeps and vents into joints at the same time sealants are being installed. Unless otherwise shown on the drawings, or directed by the Architect, locate weeps and vents spaced as recommended by the sealant manufacturer and the window and curtain wall fabricator and erector. Do not install weeps and vents at outside building corners. Do not install vents at horizontal joints immediately below shelf angles, sills, and through wall flashings.
- D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.
1. Apply sealants in the depth shown or, if none is shown, apply in accordance with the manufacturer's recommendations and the following general proportions and limitations:
 - a. Apply elastomeric sealants in sidewalk, pavement and similar horizontal joints to a depth equal to 75% of the joint width, but not less than 3/8 inch (10 mm) and not more than 3/4 inch (19 mm).
 - b. Apply elastomeric sealants, in joints not subject to traffic or other abrasion, to a depth equal to 50% of the joint width, but not less than 1/4 inch (6 mm) and not more than 1/2 inch (13 mm).
 - c. Apply non-elastomeric sealants to a depth approximately equal to the joint width.

- d. Fill horizontal traffic bearing joints slightly recessed to avoid direct contact with wheel, and pedestrian traffic. Fill horizontal traffic bearing joints with slope grade polyurethane sealants to a depth approximately equal to the joint width.
2. Pour self-leveling sealants to a depth approximately equal to the joint width.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform, beads to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces. Tool exposed surfaces of sealants to the profile shown, or if none is shown, tool slightly concave.
 1. Use masking tape to protect adjacent surfaces of recessed tooled joints.
 2. Provide a slight wash on horizontal joints where horizontal and vertical surfaces meet.
 3. Against rough surfaces or in joints of uneven widths avoid the appearance of excess sealant or compound by locating the compound or sealant well back into joint wherever possible.
- F. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:
 1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
 2. Apply a bead of silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's printed schedule and covering a bonded area of not less than a 3/8 inch (10 mm). Hold edge of sealant bead inside of masking tape by 1/4 inch (6 mm).
 3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
 4. Complete installation of horizontal joints before installing vertical joints. Lap vertical joints over horizontal joints. At end of joints, cut silicone extrusion with a razor knife.
- G. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, to produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant to comply with sealant manufacturer's written instructions.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field-test exterior wall joint-sealant adhesion to joint substrates as follows:
 1. Perform 10 tests for the first 1000 feet (300 m) of joint length for each type of exposed exterior wall sealant and joint substrate.

2. Perform one test for each 1000 feet (300 m) of joint length thereafter or one test per each floor per elevation.
- B. Field adhesion testing of sealants shall take place in the presence of a qualified technical representative of the sealant manufacturer.
1. Test Method: Test joint sealants by hand-pull method described below:
 - a. Make knife cuts from one side of joint to the other, followed by two cuts approximately 3 inches (75 mm) long at sides of joint and meeting cross cut at one end. Place a mark 1 inch (25 mm) from cross-cut end of 3 inch (75 mm) piece.
 - b. Use fingers to grasp 3 inch (75 mm) piece of sealant between cross-cut end and 1 inch (25 mm) mark; pull firmly at a 90-degree angle to the joint in the direction of side cuts and hold the sealant in this position for 10 seconds; following the 10 second time duration pull sealant at a 180 degree angle parallel to the joint and hold the sealant in this position for 10 seconds. Pull sealant away from joint to the distance recommended by sealant manufacturer for testing adhesion.
 - c. For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this procedure for opposite side.
 2. The sealant manufacturer's qualified technical representative shall record test results, and observations of joint and sealant conditions, in a field adhesion test log.
 3. Repair joint sealants pulled from test area as recommended by sealant manufacturer.
 4. The sealant manufacturer shall provide written documentation of changes in product and/or application method required to address sealant failure, observe and document retesting as required by the Architect, and provide a written statement of compliance with applicable warranties.
- C. Sealants not evidencing adhesive failure from testing 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 sealants 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 the original work.

END OF SECTION 079200

SECTION 09 96 00 - HIGH-PERFORMANCE COATINGS

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 high-performance coating systems.

- 1. Exterior Substrates:

- a. Steel.
 - b. Galvanized metal.

- 2. Interior Substrates:

- a. Steel.
 - b. Galvanized metal.

- B. Related Requirements:

- 1. Section 05 12 00 "Structural Steel Framing" for shop priming of structural steel with primers specified in this Section.
 - 2. Section 05 52 13 "Pipe and Tube Railings" for shop priming pipe and tube railings with coatings specified in this Section.
 - 3. Section 09 91 13 "Exterior Painting" for general field painting.
 - 4. Section 09 91 23 "Interior Painting" for general field painting.

1.3 DEFINITIONS

- A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- C. MPI Gloss Level 7: More than 85 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.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 2. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.
1. Submit Samples on rigid backing, 8 inches square.
 2. Apply coats on Samples in steps to show each coat required for system.
 3. Label each coat of each Sample.
 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Coatings: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each coating system.
 - a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 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.

1.7 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.
 - 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 coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior coatings in snow, rain, fog, or mist.

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. PPG Architectural Finishes, Inc.
 - 3. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
- B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Exterior High-Performance Coating Schedule or Interior High-Performance Coating Schedule for the coating category indicated.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
 - 3. Products shall be of same manufacturer for each coat in a coating system.

- C. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 50 g/L.
 - 3. Primers, Sealers, and Undercoaters: 100 g/L.
 - 4. Rust-Preventive Coatings: 100 g/L.
 - 5. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
 - 6. Pretreatment Wash Primers: 420 g/L.

- D. Low-Emitting Materials: For field applications that are inside the weatherproofing system, 90 percent of paints and coatings shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

- E. Colors: For shade structure to match: HEX value 578FA8

2.3 SOURCE QUALITY CONTROL

- A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

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 Architectural Painting Specification Manual" applicable to substrates and coating 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 if any.
- C. Clean substrates of substances that could impair bond of coatings, 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 coating systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 6/NACE No. 3.
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. 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 coatings.

3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for coating and substrate indicated.
 - 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.

3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass 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 coatings for dry film thickness.
1. Contractor shall touch up and restore coated surfaces damaged by testing.
 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating 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 coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, 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 coated surfaces.

3.6 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

- A. Steel Substrates:

1. Pigmented Polyurethane over Epoxy Zinc-Rich Primer System MPI EXT 5.1P:
 - a. Prime Coat: Primer, zinc rich, epoxy, MPI #20.
 - b. Intermediate Coat: Epoxy, gloss, MPI #77.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6), MPI #72.

B. Galvanized-Metal Substrates:

1. Pigmented Polyurethane over Epoxy Primer System MPI EXT 5.3L:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal, MPI #101.
 - b. Intermediate Coat: Polyurethane, two component, pigmented, gloss matching topcoat.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6), MPI #72.

3.7 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Steel Substrates:

1. Pigmented Polyurethane over Epoxy Primer System MPI INT 5.1F:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal, MPI #101.
 - b. Intermediate Coat: Polyurethane, two component, pigmented, matching topcoat.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6), MPI #72.

B. Galvanized-Metal Substrates:

1. Epoxy over Epoxy Primer System MPI INT 5.3D:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal, MPI #101.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss, MPI #77.

END OF SECTION 09 96 00

SECTION 101400 SIGNAGE

PART 1 - GENERAL

1.1 GENERAL

- A. Substitutions: In order to substitute materials or methods, prior approval must be obtained at least 72 hours before bid opening. Approved substitutions shall be shared with other bidders. After execution of the contract, all substitutions shall be governed by the Specifications.
- B. Approvals: All submittals and articles of any kind necessary for the work are subject to approval by Architect and Owner.
- C. Coordination: Sign Fabricator will coordinate on-site work, electrical service and final sign placement with the Contractor for each parcel of land. Where structural support for signage is required, it shall be provided and installed by Sign Fabricator, and all adjacent landscaping, irrigation, and other damages caused by installation, repaired as required.
- D. Sign Definitions, Descriptions and Characteristics: Refer to Design Intent Documents (the Drawings), Message Schedule and Sign Location Plans for precise definition and proposed message of each sign.
- E. Time of Completion: Sign Fabricator shall complete all work in accordance with schedule milestones. All activities shall be sequenced to coordinate with field progress.
- F. Pre-Construction Conference: A pre-construction meeting will be held with representatives from Owner, Sign Fabricator and Architect to establish the procedure for communication and coordination with the Contractor and subsequent trades.
- G. Field Measurements: Measure in-place any existing construction as needed for fabrication and execution. No changes to fees or schedule will be allowed for differences between Design Intent dimensions and field measurements.
- H. Electrical Service: Requirements shall be determined as soon as possible. Electrical service must be coordinated with service available at each sign location. Service may vary according to location. Only new electrical components and respective lamps shall be utilized. Reasonable access for maintenance of components and lamps is required.
- I. Instruction: Prior to acceptance, establish with Owner an instruction and training program for Owner personnel. Notify Owner in writing at least seven (7) days prior to commencement of the program by providing an outline of topics indexed to the Maintenance and Operating Manual. Provide a trained instructor. Instruction and training shall include, but are not limited to, procedures to be followed in the normal day-to-day maintenance and operation of the work.

- J. Permits: Sign Fabricator shall make all submittals for permits; shall be responsible for paying all fees, making adjustments as required, or any task necessary for obtaining local building and installation permits for the proper execution of the work. All such permits must be obtained prior to fabrication of the sign item. Copies of all permits shall be delivered to Owner.
- K. Markings and Labels: Visible labels are not allowed except as required. When necessary, locate markings, labels, manufacturer names and other identifications, and conceal them from public view.
- L. Final Location of Signs: The location of signs as shown on the Sign Location Plans is for general reference only and, in some cases, is not representative of the exact final location. Final locations of signs shall be field located in coordination with Architect and Owner at the site. Sign Fabricator shall arrange for meetings at the site to accommodate direction of final locations according to project schedule.
- M. Discrepancies: Any discrepancies in the Drawings or graphic message schedule, in field dimensions or conditions and/or changes required in construction details shall be resolved by Architect. Sign Fabricator shall advise Architect as these conditions are discovered. Sign Fabricator shall not resolve these issues independently.
- N. Rights to Design: Sign Fabricator may not manufacture, reproduce, or exhibit these designs, or modify them for any other purpose outside of this current contract without written approval of Architect and Owner.
- O. Structural Documents: Provide signed and sealed drawings for structural components as required.

1.2 REFERENCES

- A. National Association of Architectural Metal Manufacturers (NAAMM) "Metal Finishes Manual."
- B. American Welding Society (AWS): AWS D1.1 "Structural Welding Code, Steel," and AWS D1.2 "Structural Welding Code, Aluminum".
- C. Underwriters Laboratories Inc. (UL): Standards for Safety, UL Publication 48 "Electric Signs."
- D. National Fire Protection Association (NFPA): National Electrical Code (NEC) 2017 Edition

1.3 SUMMARY OF WORK

- A. Sign Fabricator will be held to furnish all work as specified in the Drawings, Specifications, Message Schedule, and Sign Location Plans as provided by Architect. This includes but is not limited to the following: all fabrication, installation, structural engineering, schedule and sequence coordination, anchor and support devices, work process and product of subcontractors, and all accessories required to produce the complete sign system described.
- B. Scope of work includes but is not limited to the following:
 - 1. Free standing information assemblies.

1.4 SUBMITTALS

- A. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- B. Shop Drawings: Furnish plans, elevations, sections, and details of fabrication and erection for all items outlined in the Drawings. Include all materials, shapes, dimensions, finishes, mounting heights, method of anchoring and connections, and mounting methods. Provide notations for reinforcement, structural members, supports, surfaces, finishes, materials, and accessories. Repackaging the Drawings with Sign Fabricator's new title block and delivering as submittals shall not be accepted.
- C. Sign Layouts: Provide full-scale layouts for each sign type including text, symbol artwork, and any other graphic elements as solid black with sign face outlined. Provide scaled layouts for all signs. All Sign Layouts should indicate the following: complete layout including proper character spacing and heights; dimensions of all layout elements relative to the sign panel and to one another and exact typeface and letter-spacing.
- D. Electrical: Provide wiring diagrams and electrical load requirements for signs with illuminated characters, panels or faces.
- E. Schedule: Submit a project schedule that conforms to project occupation and opening dates. Include submittals, review, production milestones, shipping, on-site preparation, installation and follow-up.
- F. Materials Samples: Submit per schedule for approval. Provide three (3) sets of 10" x 10" non-returnable samples of all materials, colors, and finishes as specified. Provide three (3) complete sets of all exposed hardware and fasteners to be used.
- G. Extra Materials: Deliver to Owner, in manufacturer's original packaging and store at the project site where directed: one (1) gallon of each finish paint color for touch-up purposes; six (6) lamps of each type/model and size used; one (1) cooling fan of each type/model and size used; and one (1) ballast of each type/model and size used. Provide paint formula index for every color used. Provide packaging and protection for extended storage. Deliver to owner, all molds or forms used to produce signs.

- H. Supplementary Product Literature: Submit manufacturer's literature describing the general properties of each product to be used.
- I. Structural Calculations: Provide exterior sign assemblies designed, tested, and installed to withstand positive and negative wind loads per site specific code requirements as determined by a licensed professional structural engineer, registered in the State of Nevada. Furnish engineering calculations to show that maximum stresses and signage support system, do not exceed specified performance requirements under full design loading. Limit deflections on signage members under full wind loading to 1/4-inch. Calculations shall be prepared and sealed by a structural engineer licensed in the State of Nevada.
- J. Qualification Data: For installer, suppliers, and subcontractors. Describe nature and extent of project involvement of each. Use standard AIA form. Qualification Data must be provided ten (10) working days prior to commencement of work. Relevant sign types for each must be referenced.
- K. Signing Warranty: Submit to Owner for Owner's documentation, a 1 year written warranty (effective the date of final acceptance) covering all signs, signed by Sign Fabricator and Installer, agreeing to repair or replace work which has failed as a result of defects in materials or workmanship or installation. Upon notification of such defects, within the warranty period, make necessary repairs or replacement at the convenience of Owner.
- L. Linear Polyurethane Paint Factory Finish Warranty: Submit to Contractor for Owner's documentation. Furnish 5-year written warranty, warranting that the factory-applied linear polyurethane finishes will not develop excessive fading or excessive non-uniformity of color or shade, and will not crack, peel, pit, corrode or otherwise fail as a result of defects in materials or workmanship within the following defined limits. Upon notification of such defects, within the warranty period, make necessary repairs or replacement at the convenience of Owner.
 - 1. "Excessive Fading": A change in appearance, which is perceptible and objectionable as determined when visually, compared with the original color range standards.
 - 2. "Excessive Non-Uniformity": Non-uniform fading to the extent that adjacent panels have a color difference greater than the original acceptable range of color.
 - 3. "Will Not Pit or Otherwise Corrode": No pitting or other type of corrosion, discernible from 10' (3m), resulting from the natural elements in the atmosphere at the project site.
- M. Maintenance and Operating Manuals: Submit two (2) copies for Owner's documentation and one (1) copy to Architect. Furnish complete manuals describing the materials, devices and procedures to be followed in operating, cleaning and maintaining the work. Include manufacturers' brochures and parts lists describing the actual materials used in the work, including metal alloys, finishes, electrical components and other major components. Include in the manual samples of all vinyls or films used, samples of all paints used, and all paint formulas used. Assemble manuals for component parts into single binders identified for each system.

- N. Burn-in Certification: Submit certification that Sign Fabricator has completed the burn-in of all illuminating signs as required under Section 1.3 F.

1.5 QUALITY ASSURANCE

- A. Mock-ups and Prototypes: Provide a mock-up (partial for large signs; complete for smaller signs) of all sign types. Utilize the same materials and installation methods in the mock-up as intended for the final work. Schedule the installation so that the mock-up may be examined, and any necessary adjustments made, prior to commencing fabrication of the final work. Replace unsatisfactory items as directed. When accepted, mock-up shall serve as the standard for materials, workmanship, and appearance for such work throughout the project. Approved samples will not be returned for installation into project.
- B. Work-In-Progress Approvals: Scheduled or unscheduled viewings at the shop or factory may be initiated as deemed necessary to ensure continued quality control and make any adjustments required during fabrication. Unsatisfactory items are to be corrected by Sign Fabricator as directed.
- C. Source Limitations: Obtain each material type, shape or size from one source from a single manufacturer.
- D. Materials: Cut all required faces, trim, or continuous surfaces from a single piece of base material unless overall size cannot be obtained from a single piece due only to its size. Materials shall be new, un-used in any previous work, free of imperfections of surface, substance, manufacture, or damage from shipping or handling. Materials shall be utilized in the fabrication process only for the purpose intended by the original manufacturer or supplier.

1.6 QUALITY OF WORKMANSHIP

- A. Sign Fabricator: Sign Fabricator shall be responsible for the quality of all materials and workmanship required for the execution of this contract including materials and workmanship of any firm or individual who act as Sign Fabricator's sub-contractor. Sign Fabricator shall be responsible for providing up-to-date drawings, specifications, graphic schedule, etc., to all sub-contractors. Sign Fabricator shall provide a supervisor who will be assigned for the duration of the project.
- B. Installer Qualifications: Installer shall provide workers trained and supervised by signage manufacturer. An authorized representative from Sign Fabricator shall be present for the duration of the on-site installation.
- C. Fabrication Qualifications: Fabrication and installation shall be conducted by trained individuals working under the direct and continual supervision of Sign Fabricator or sub-contractors as disclosed on the bid form. All materials shall remain under the direct control of ~~the~~ Sign Fabricator or his disclosed sub-contractors during the entire fabrication and installation process.

- D. Templates: Templates will be required for installation of certain sign items noted in the Drawings. Templates must be created only after complete installation of finish surfaces to receive installed sign.
- E. Sign Locations: Sign locations shall accommodate full door swing where applicable, in addition to required mounting height and position requirements.
- F. Dimension and Discrepancies: Sign Fabricator shall notify Architect and Owner of any discrepancies in the Drawings (including discrepancies between written dimensions and scaled dimensions), Sign Location Plans and Message Schedule, in field dimensions, conditions and/or changes required in construction details, prior to fabrication and installation.

PART 2 - PRODUCTS

2.1 SIGN MATERIALS

- A. Information Assemblies, Freestanding: Provide smooth kiosk surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.59 mm) measured diagonally from corner to corner complying with the following requirements:
 - 1. Steel tube: Structural tube, thickness as required by engineering to support weight of dynamic displays.
 - 2. Stainless steel: 18 gage metal cladding secured with stainless steel machine screws and concealed mounting brackets (may be custom assembly).
 - 3. Tempered glass sheet: 0.25 inch (4.06 mm) thick, back painted. Mount glass in painted 0.5 inch (9.02 mm) metal frame, as indicated in contract documents.
 - 4. Edge/corner condition: Square cut.
 - 5. Hinge: Swing clear pin and barrel continuous hinge to support max. door weight 600 lbs.
 - 6. Frame/support internal structure: Aluminum internal tube frame and graphics/display support with external stainless steel end plates, and base kick, assembled with concealed mechanical fasteners.
 - 7. Display Support brackets: Display provided by Owner. Mount display to backing panel with bracket and holder to suit display. Hardware may be used from Hafele America, Mockett, or other source.
 - 8. Color: As indicated in contract documents.
 - 9. Mounting: As indicated:
 - a. Freestanding with concealed anchors into floor slab (F5A)
 - b. Freestanding integrated into any millwork. Coordinate with General Contractor.

- B. Adhesives: In conjunction with silicone adhesives for installation of wall signs, use vertical bands of double-sided 3M VHB tape in minimum thickness required. Do not use this method for vinyl-covered or rough surfaces unless otherwise indicated. Use liquid-silicone adhesive recommended in writing by manufacturer to attach signs to irregular, porous, or vinyl-covered surfaces. Specific products for the intended purposes shall be used per manufacturer's recommendations.
- C. Metals, General: Standard thickness for all sheet/panel surfaces shall be .125" minimum unless otherwise noted. Contractor shall recommend and use material thickness sufficient to prevent any waviness, "oil canning" or warping of the surface. Remove tool and die marks and stretch lines or blend into finish. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece. When polishing, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- D. Metals, Aluminum: Aluminum shall be suitable for ornamental, architectural work. Surface finish shall be smooth, free of extrusion marks or imperfections. Alloy shall be selected to meet the structural requirements of the specific application. Aluminum shall not directly contact any other materials. Contact surfaces are to be dielectrically separated with a zinc-chromate coating, bituminous paint, or a gasket.
- E. Metals, Stainless Steel: Stainless steel shall be suitable for ornamental and architectural work. Surface finish shall be smooth, free of all extrusion marks or imperfections. Alloy shall be selected to meet the structural requirements of specific application.
- F. Metals, Structural: Structural metal for concealed framing shall be of galvanized rolled steel or equal as required to satisfy structural requirements.
- G. Acrylic Sheet Plastic: Use Plexiglas II as manufactured by Rohm and Haas Co., or equal. Thickness shall be as indicated or not less than 1/8" thick. Contractor shall provide color and finish samples of all plastics for approval before fabrication; no substitution in color, thickness, or finish of plastics will be accepted without written approval. All plastics shall be of uniform color, translucence and illumination, as supplied by manufacturer. Any exposed edges of acrylic shall be finished so as no saw marks are visible. Sheet materials indicated as "clear" shall be supplied as optically colorless sheet.
- H. Flexible Sign Face Substrate: All substrate shall be of uniform color, translucence and thickness, as supplied by manufacturer. Any exposed edges of substrate shall be finished so as no saw marks are visible.
- I. Concrete: Installation of anchoring devices into concrete slab shall be adjusted to avoid penetrating existing reinforcing conduit, etc. contained in the concrete slab.
- J. Decal or Transfer: Printed paper or vinyl suitable for reproducing the design onto material indicated, shall be used as required. Submit samples to Architect and Owner for approval.

- K. Fasteners: Bolts, nuts, screws, washers, anchors and other devices required to complete the work. Same basic metal or alloy as the metal fastened, and finished to match in color and texture. Stainless steel alloy shall be used to join dissimilar materials. Use of exposed fasteners is prohibited unless otherwise indicated in the Drawings. Use of fasteners, anchors, adhesives and other attachments shall be in accordance with requirements and recommendations of the manufacturer of the device or material.
- L. Hardware/Hinges: Provide and install all incidental hardware necessary for the proper functioning of the signs, including but not restricted to materials and products covered in this section. Provide stainless steel hinges for all hinged access panels. Provide pin tumbler locks for all access panels requiring locks. External hardware shall conform to the external appearance of the sign.
- M. Insulation: Separate all ferrous and non-ferrous metals with non-conductive gaskets to prevent electrolysis. In addition to gaskets, provide stainless steel fasteners for some cases as required.
- N. PVC Tubing: Provide PVC (polyvinyl chloride/plastic) tubing in thickness and strength, with concealed support for structural integrity, suitable for signage as specified. Surfaces shall be smooth and clean for application of painted finishes and vinyl graphics. Mount/secure as indicated in the Drawings.
- O. Welding Electrodes and Filler Metal: Provide the alloy and type required for strength, workability, compatibility and color match after grinding smooth and finishing the fabricated product.
- P. Vinyl Graphics: Use pressure-sensitive, non-yellowing, non-peeling and weather resistant vinyls as specified. Use approved fonts and equipment as specified.

2.2 ELECTRICAL COMPONENTS

- A. Wiring and Equipment: Provide and install electrical materials such as ballasts, transformers, lamps, sockets, neon units, connectors, and all other equipment. All equipment shall be new and shall be approved by Underwriters Laboratories, Inc. The assembly of all components within the illuminated signs shall conform to current Underwriters Laboratories, Inc. standards. All wiring and equipment shall be concealed within the sign structure unless otherwise instructed.
- B. Transformers: Coordinate location of remote transformers with building construction. Ensure that transformers are accessible after completion of work. Transformers and electrical hardware shall be concealed, non-audible and non-visible to pedestrian and vehicular traffic in the immediate area of the completed installation. No electrical controls or devices are to be attached to any sign face or support unless required by local authorities having jurisdiction.
- C. Exterior Sign Locations: Electrical components for exterior sign locations shall be suitable for wet location and certified by the manufacturer.
- D. Conduit and Devices: Provide rigid steel conduit, junction boxes and associated devices in accordance with applicable codes as required.

- E. Wiring: Minimum #12 AWG copper. High tension wiring shall not be less than GTO 15 wire as manufactured by Carol Cable company or approved equal. All wiring shall be AWM 90 0 centigrade 1000 volt TW/MTW U.L. file no. 18971. Wiring connectors for wire splicing shall be U.L. approved 1000-volt capacity. They shall be Scotch Lock type Y or R or equal. All splices shall be placed as to easily access for inspection.
- F. Ballasts: As required for internally illuminated cabinet signs, in quantity and arrangement as recommended by ballast manufacturer; accessible for maintenance.
- G. Disconnect Switch: All signs or sign components with electrical service shall be equipped with an approved external disconnect switch, flush mounted on the cabinet/sign, with circuits and capacity to control all primary wiring within the sign. Location of switch must be shown on shop drawings and is subject to approval.
- H. Illumination: All signs with fluorescent fixtures shall utilize minimum 800 milliamp T12 output cool white fluorescent lamps at the length and placement necessary to provide even illumination without light leaks. All lamps and ballasts shall be provided by Sign Fabricator. Provide waterproof flush access panel(s), concealed wherever possible. Conduit wiring and electrical equipment from the field electrical connection to any part of the sign and within the sign shall be provided by Sign Fabricator, and Installer shall be a licensed electrician.

2.3 ILLUMINATION

- A. Internal or External Illumination: Unless otherwise indicated lighting fixture/source must emit a color-balanced, consistent and uniform light effect with no browning, flickering, haloing, or other uneven effect. No "hot" or "cool" spots will be acceptable. Homogenous illumination is required.
- B. Illuminated Characters: Illuminate characters in manner indicated. Make provisions for servicing and concealing connections to building electrical system. Coordinate electrical characteristics with those of power supply provided.
- C. Ventilation: While maintaining a proper weather seal, provide for sufficient ventilation of sign components to prevent overheating or warpage; allowing for color of sign, mounting surface, climate conditions, etc. In providing for ventilation, protect sign from elements (rain, wind, debris, etc.) that might cause operational or cleaning problems. Signs/cabinets with light leaks will not be accepted. Sign Fabricator shall utilize stainless steel bug mesh screen for integration with weep holes or vent / louvers on the signs to prevent insect migration into illuminated signs.
- D. Neon: Form neon tubing as required, using tubes individually filled at optimum pressure required for uniform lighting. Butress threaded glass posts, securely attach tubes to supports with pure annealed copper wire ties, without strain on tubing.

2.4 FINISHING MATERIALS

- A. Painted surfaces are to be catalyst hardened acrylic polymer using a base clear coat system. Coatings shall not crack, peel, craze, discolor, or fade under ultra-violet light conditions.
- B. Coatings shall be compatible with the surface to which they are applied. Finish applications are to be smooth and uniform, free of "orange-peel" or other irregularities, applied according to manufacturer's recommendations.
- C. Color breaks on sign surfaces shall be sharp, without serration or color bleed or shadows. All drips, splatters and over sprays shall be removed.
- D. Brushed and satin finished aluminum surfaces are to be consistent and uniform among all the signs of the system.
- E. Coatings shall accurately match the colors specified or color swatches furnished by Architect.
- F. Acrylic Linear Polyurethane enamel: Two components, acrylic aliphatic isocyanate / acrylic polyurethane having ultraviolet (UV) inhibitors and engineered for exterior application by Matthews Paint Company or approved equal.
- G. Primer for Aluminum: Two-part component primer: One-coat Matthews 74-734 and 74-735 Metal Pretreat at .25 mils dry film thickness or one-coat Matthews 74-793 Spray Bond at .15 to .25 mils dry film thickness or Wyandotte / AKZO Grip-Guard Wash Primer (2Afy-31284) with Grip-Guard Wash Primer Hardener (10AFK-31285) combined and applied per manufacturer's specifications or approved equal (primer) for the application of the pre-approved and pre-formulated paint system.
- H. Primer for Steel: Two-part component primer: One-coat Matthews 74-734 and 74-735 Metal Pretreat at .25 mils dry film thickness or Wyandotte / AKZO Grip-Guard Wash Primer (2Afy-31284) with Grip-Guard Wash Primer Hardener (10AFK-31285) combined and applied per manufacturer's specifications or approved equal (primer) for the application of the pre- approved and pre-formulated paint system.
- I. Clear Sealers: Crystal clear matte polyurethane sealers by Matthews Paint. Sealers are to resist rust and corrosion associated with exposure to salt air.
- J. Protection: Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping.
- K. Variations: Variations in appearance of abutting or adjacent pieces are not acceptable. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are not acceptable.
- L. Anodized Aluminum Components/Panels: If required provide anodized (application of aluminum oxide film coating in clear or colored dye finish) aluminum panels or parts to match specified color, grain, finish and specifications.

2.5 FABRICATION OF SIGNS AND SUPPORTS

- A. General: Provide custom manufactured sign assemblies, components completely fabricated and finished at factory before delivery to site. Construct to accurate detail and dimensions as shown in the Drawings, and as reviewed on shop drawings. Fit and assemble the work at shop to the greatest extent possible, and mark the components as required to facilitate assembly during installation. Fabricated and assembled materials, prior to painting and finishing shall be free of imperfections, roughness, burrs, open joints, misalignment of components, surface irregularities, pits, piping, or any other substandard feature or condition.
- B. Seams and Joints: Added joints shall be ground, filled and finished flush and smooth with adjacent work. Such seams shall be invisible after final finish has been applied. Spot welded joints shall not be visible on exterior of signs after final finish has been applied. No gaps, light leaks, waves, or oil canning will be permitted in work.
- C. Metal Signs and Supports: Fabricate exposed surfaces uniformly flat and smooth, without distortion, pitting or other blemishes. Form exposed metal edges to a smooth radius. Permanently bond the laminated metal components and honeycomb core with adhesive or sealant in accordance with product manufacturer's recommendations. Grind exposed welds and rough areas to make flush with adjacent smooth surfaces.
- D. Castings: Exposed surfaces shall be uniformly free from porosity, roughness, pits, sand holes, and other defects. Edges are to be filled and ground smooth. Faces chemically etched and mechanically polished for specified finish. Castings shall be of alloy and temper recommended by manufacturer for casting process used and for type of use and finish indicated. Concealed studs shall be used unless otherwise indicated.
- E. Galvanizing: Provide for steel components in exterior construction and where noted to be galvanized. Complete the shop fabrication prior to application of the zinc coating. Remove mill scale and rust, clean and pickle the units as required for proper pretreatment of the surfaces.
- F. Support, Backing and Blocking: Sign Fabricator shall provide engineered sign supports anchored to building structure where required and to meet requirements of applicable building codes. Support or backing requiring installation within the building wall construction shall be immediately relayed to Architect and Owner for field coordination. Furnish templates for installation of anchorage devices.
- G. Access Doors and Frames: Access doors and frames shall be flush with the material in which they occur, unless otherwise specified. Access doors and frames shall be provided upon prior written-approval of Architect. Each trade providing access doors and frames shall verify the need for fire-rated doors on their respective drawings. Access doors in walls, partitions or ceilings shall bear UL fire-rated labels of same fire rating. If access doors and frames are required to be exposed to view, they shall match the adjacent finishes of the surface to which they are to be installed, unless otherwise specified. Obtain Owner's approval for location of each access door prior to placement.

2.6 SHOP APPLICATION OF SIGN FINISHES

- A. Sign Graphics: Provide the letters, numerals, symbols, and other graphics markings, using the finish materials shown. Apply the graphics neatly, uniformly proportioned and spaced, and accurate within the dimensions indicated. Prepare the substrate surfaces and apply finish materials in accordance with manufacturers' instructions.
- B. Metal Finishes: Remove scratches, abrasions, dents and other blemishes before applying finish. Apply relevant finishes to the fabricated work, with texture and reflectivity as specified in the Drawings.
- C. Linear Polyurethane Finishes: Clean the surfaces as required for proper adhesion of coatings. Use cleanser and water, and/or chemically treat as recommended by paint manufacturer to remove deleterious film or residue. Provide pretreatment and primer in accordance with manufacturer's recommendation.

2.7 GRAPHIC APPLICATION

- A. Preparation: Surfaces to receive the graphic markings shall be clean, dry, and otherwise made ready for application of the materials. Accurately measure and lay out the required marking configurations as indicated in the Drawings. For surfaces painted with low/no VOC, the oil layer must be removed with rubbing alcohol & water solution by thoroughly cleaning the surfaces twice (or as recommended by the vinyl manufacturer), and an adhesion test must be performed prior to installation.

PART 3 - EXECUTION

3.1 GENERAL

- A. Protection: Protect the work during the construction period so that it will be without any indication of use or damage. Leave the work clean and free from defects at the time of acceptance.
- B. Final Walk-Through and Punch list: Final walk-through will be held with Architect and Owner to review the finished installation. A punch list of all items requiring modification will be developed and issued. Architect and Owner reserve the right to reject all or part of a sign that does not correspond to the Drawings, Specifications or the approved shop drawings. Sign Fabricator shall promptly conduct repair and completion of all items for final acceptance by Owner.
- C. Guarantee: Sign Fabricator to provide full guarantee of all workmanship, materials, equipment, etc. of this installation for a period of one (1) year after final acceptance. Sign Fabricator shall replace/repair any defective work within thirty (30) days after notification by Owner throughout the duration of this period.

- D. Fabrication Errors: If Sign Fabricator has made an error in copy (message), color, material, quality, etc. these items must be corrected within thirty (30) days of observation of error (at no additional cost). Sign Fabricator will be notified with a written punch list as errors are discovered.
- E. Erection of Signs: Set and attach the work accurately in location, alignment and elevation, plumb, level and true, as measured from established reference points and from other work already in place. Fit components accurately together to form tight joints and secure connections. Coordinate, through Architect and Owner, with other trades and make connections of illuminated signs to electrical service. Exterior wall penetrations and blocking are to be coordinated immediately upon award of the contract. Test illuminated sign components and adjust operation for proper performance.
- F. Illuminated Signs: Burn-in all illuminated signs for a period of 100 hours prior to delivery to the job site.
- G. Adjusting: Neatly repair minor blemishes or marring on finished surfaces, so that repairs are imperceptible. Completely replace components having permanent non-removable scratches, stains, or other defacement.

3.2 EXAMINATION

- A. Verification of Conditions: Sign Fabricator must examine the areas to receive the work and the conditions under which the work will be performed. Prior to commencing work, verify that items, including anchor inserts, and electrical power provided are sized and located to accommodate work. Sign Fabricator shall remedy conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.
- B. Pre-Installation Meeting: A pre-installation meeting will be held with Architect and Owner to mutually agree on all installation details, placement, etc.

3.3 INSTALLATION

- A. General: Complete installation shall be in accordance with manufacturers' printed instructions and accepted shop drawings and best industry practice. Sign Fabricator will be responsible for daily cleanup of their areas of work. Locate signs and accessories as indicated in the Drawings, using mounting methods of types described and in compliance with manufacturer's written instructions and best industry practice. Install signs level, plumb, and at heights indicated, with sign surfaces free from distortion and other defects in appearance.
- B. Shim Plate Mounting: Provide concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach signs to shim plate using mechanical fasteners or adhesives as indicated in the Drawings. Where shim plate is exposed, submit a decorative cover for review and approval prior to installation, as required.

- C. Mechanical Fasteners: Use non-removable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer, engineer, or best industry practice.

3.4 CLEANING

- A. Upon completion of the work, remove unused materials, debris, containers and equipment from the project site. Remove protective coverings and clean the exposed surfaces of the work to remove dirt, stains and other substances, by methods as recommended by manufacturer. Wash, clean, and leave paved areas without stains.
- B. Removal of materials and devices that protect installed work at the time of substantial completion as agreed in advance with Owner.
- C. Touch up all fasteners or finished surfaces scratched or blemished during installation.

END OF SECTION

SECTION 311000 – SITE CLEARING

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.
- B. Standard Specifications for Public Works Construction, 2012, as adopted by Washoe County.
- C. Geotechnical Investigation Report, “Geotechnical Investigation Sparks Forecourt, Sparks, Nevada”, prepared by Black Eagle Consulting, Inc., April 8, 2022.

1.2 SUMMARY

- A. The project requirements for Site Clearing shall be those specified in Section 300, Clearing and Grubbing and Section 301, Removal of Existing Improvements, of the Standard Specifications for Public Works Construction, 2012, the requirements stated herein and the requirements shown on the contract documents.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 REQUIREMENTS

- A. The project requirements for Site Clearing shall be those specified in Section 300, Clearing and Grubbing and Section 301, Removal of Existing Improvements, of the Standard Specifications for Public Works Construction, 2012.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

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.
- B. Standard Specifications for Public Works Construction, 2012 Edition, as adopted by Washoe County.
- C. Geotechnical Investigation Report, “Geotechnical Investigation Sparks Forecourt, Sparks, Nevada”, prepared by Black Eagle Consulting, Inc., April 8, 2022.

1.2 SUMMARY

- A. The project requirements for Rough Grading and Site Earthwork shall be those specified in Sections.
 - 1. 302 – Subgrade Preparation
 - 2. 303 – Unclassified Excavation
 - 3. 304 – Unclassified Fill
 - 4. 305 – Trench Excavation and Backfillof the Standard Specifications for Public Works Construction, Latest Edition, contract documents and the Geotechnical Investigation Report, “Great Basin College Health Science & Technology Building, Winnemucca, Nevada, dated May 22, 2020, prepared by Black Eagle Consulting, Inc., the requirements stated herein and the requirements shown on the contract documents.

1.3 SUBMITTALS

- A. Test Reports: Testing laboratory will submit the following reports directly to the architect and shall copy the contractor:
 - 1. Analysis of soil materials, whether procured on or off site, and including fill, backfill, and barrow materials.
 - 2. Verification of each footing subgrade.
 - 3. Comprehensive strength or bearing test reports.

1.4 QUALITY ASSURANCE

- A. Testing Laboratory Services: The owner will secure and pay for the services of a geotechnical engineer to classify existing soil materials, to recommend and to classify

proposed borrow materials when necessary, to verify compliance of materials with specified requirements, and to perform required field and laboratory testing.

1.5 SITE CONDITIONS

- A. Traffic: Do not interfere with or close public ways without permission of governing authorities. Do not interfere with adjacent private facilities.
- B. Site Utilities:
 - 1. Advise utility companies of excavation activities before starting excavations. Locate and identify underground utilities passing through work area before starting work
 - 2. Protect existing utilities indicated to remain.
 - 3. Do not interrupt existing utilities without advance notice to and written approval from the owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Where sufficient approved materials are not available from required excavations on site, obtain and pay for materials from approved sources off site without charge to the owner.
- B. Before each soil material proposed for use as fill or backfill, whether obtained on or off site, testing laboratory shall classify soil material, develop Proctor curve, and perform any other tests required.
- C. Obtain approval of the architect for each soil material.
- D. Backfill and Fill Materials: Materials classified as satisfactory.
- E. Satisfactory Soils: Those complying with Geotechnical Inspection Requirements.
- F. Unsatisfactory Soils: Those not complying with Geotechnical Inspection Requirements.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protection: Provide markers indicating limits of work and clear identification of items and areas requiring protection.
- B. Provide barricades, warning signs, and warning lights around open excavations as necessary to prevent injury to persons.
- C. The contractor is solely responsible for determining the potential for injury to persons and damage to property.

1. Where such potential is present, take appropriate protective measures. Protect persons from injury and protect existing and new improvements from damage caused directly or indirectly by construction operations.

3.2 EROSION CONTROL

- A. To the maximum extent practicable, prevent erosion or displacement of soils and discharge of soil-bearing water runoff to adjacent properties and waterways.
- B. Provide erosion control during the entire project in accordance with applicable regulations.
- C. The contractor shall file a Notice of Intent with the Nevada Department of Environmental Protection and provide the required Storm Water Pollution Prevention Plan.

3.3 PROTECTION OF TREES

- A. Provide temporary guards to protect trees and vegetation to remain. Place guards so as to prevent all forms of vehicular traffic or parking within drip lines.
 1. Do not allow excess foot traffic within drip lines.
 2. Do not stockpile construction materials, soil, or aggregates within drip lines.
 3. Water trees and other vegetation to remain within limits of the area of construction activities as required maintaining their health during course of construction operations.

3.4 DEWATERING

- A. Do not allow surface or ground water to flow into or accumulate in excavations.
- B. Do not allow water to flow in an uncontrolled fashion across the project site or to erode slopes or to undermine foundations. Do not allow water to be diverted onto adjacent properties. Arrange excavation operations so as to provide continual and effective drainage of excavations.
- C. Provide and maintain temporary diversion ditches, dikes, and grading as necessary; do not use trench excavations for this purpose. When required by surface or subsurface water conditions, provide sumps, well points, french drains, pumps, and other control measures necessary to keep excavations free of water. When existence of ground water near or above final excavation level is indicated or suspected, provide control measures prior to excavating to water level and maintain water level continuously below working level.

3.5 EXCAVATION

- A. Explosives: Do not use explosives.
- B. General: Excavation includes the removal of any materials necessary to achieve the required subgrade elevations and includes re-use or disposal of such materials.

1. Excavation will not be classified for payment purposes to distinguish between earth, rock, obstructions, or other materials.
- C. Unnecessary Excavation: The expense of excavation of materials outside of limits indicated or ordered in writing by the architect and the correction thereof to the satisfaction of the architects shall be borne by the contractor.
1. Unnecessary excavation under footings: Either deepen footings to bear on actual subgrade elevation without changing top elevations or place concrete fill up to required elevation, as required by the architect.
 2. Unnecessary excavation other than under footings: Either place compacted fill or otherwise correct conditions, as required by the architect.
- D. Approval of Subgrade: Notify the architect when required elevations have been reached.
1. When required by the architect due to the unforeseen presence of unsatisfactory materials or other factors, perform additional excavation and replace with approved compacted fill material in accordance with the architect's instructions.
 2. Payment for unforeseen additional work will be made in accordance with provisions for changes in the work. No payment will be made for correction of subgrades improperly protected against damage from freeze-thaw or accumulation of water, or for correction of otherwise defective subgrades.
- E. Excavation for Pavements: Excavate, shape, and compact to the lines, subgrade elevations, and cross sections indicated.

3.6 STORAGE

- A. Stockpile materials to be used for filling and backfilling, including excavated materials classified as satisfactory soil materials, at locations indicated or as directed. Stockpile in a manner to freely drain surface water: cover if necessary to prevent wind-blown dust.
1. Store soil materials without intermixing. Protect from contamination with other soils or debris.
 2. Do not stockpile materials inside of drip line of trees to remain.

3.7 BACKFILLING

- A. Installation: Place approved soil materials in layers to required elevations.
1. Do not place material on muddy or frozen surfaces or on surfaces containing frost.
- B. Installation: Place satisfactory soils materials in layers to required subgrade elevations.

3.8 FILLING

- A. Preparation: Verify that area has been stripped of vegetation including roots below grade. Remove and dispose of any unsatisfactory soils.

1. When filling slopes steeper than 1 in 4 rise, plow, step, or break up surfaces to promote bond of new to existing material.
2. Should density of subgrade to receive fill be less than specified for fill, break up and pulverize subgrade to a depth of at least 6 inches, moisture condition if necessary, and recompact to required density at optimum moisture content.

3.9 Pavement and Building Subbase Course Placement

- A. Place lifts such that compaction true to grade and level is accomplished with a minimum of surface disturbance and segregation of degradation of materials. Maintain grade control and cross section by means of line and grade stakes. Maintain moisture content within prescribed limits during placing and compacting.
- B. When the total thickness of subbase is less than the maximum lift thickness permitted, place material in a single lift. When the total thickness of subbase is greater than the maximum lift thickness permitted, place materials in two or more lifts of uniform thickness with no lift less than 3 inches in thickness.
- C. Place materials along the edges of the subbase course so as to maintain compaction of the subbase course. Construct at least a foot width of shoulder simultaneously with each lift of the subbase course.
- D. Cut any overbuild to grade. Should top elevation be lower than allowable tolerances, scarify to a depth of 3 inches, add new material, and recompact to bring to grade within required tolerances.

3.10 COMPACTION

- A. Place materials used in backfilling and filling in layers not exceeding loose depths as follows:
 1. Heavy equipment compaction: 8 inches.
 2. Hand-operated tampers: 4 inches.
- B. Place material simultaneously on opposite sides of walls, small structures, utility lines, etc. to avoid displacement or overstressing.
- C. In-Place Density Requirements: Compact soil to not less than the values given within the soils report prepared by Black Eagle Consulting, expressed as a percentage of maximum density at optimum moisture content.
- D. Moisture Control: During compaction, control moisture of subgrades and subsequent lifts to within tolerances from optimum moisture content as recommended by testing laboratory. Wet surface with water when additional moisture is required. Aerate soil to aid in drying or replace soil when excessive moisture is present.

3.11 GRADING

- A. General: smooth grade to a uniform surface that complies with compaction requirements and required lines, grades, and cross sections and is free from irregular surface changes.
- B. Provide smooth transition between existing adjacent grades and changed grades. Cut out soft spots, fill low spots, and cut down high spots to conform to required surface tolerances.
- C. Slope grades to direct water away from structures and to prevent ponding. Finish subgrade to required elevations within the following tolerance:
 - 1. Paved areas: Plus or minus 0.05 foot.
 - 2. Exterior steps and ramps: Plus or minus 0.05 foot.

3.12 PROOFROLLING

- A. After completion of required compaction and immediately prior to proceeding with subsequent construction, proofroll in the presence of testing laboratory representative.
- B. Proofroll using a heavy pneumatic-tired vehicle having four tires abreast, each tire loaded to 30,000 pounds and tire inflated to 150 psi. Provide 30 coverage's of the area to be proofrolled, one coverage being defined as the application of one tire print over the entire area. Maintain optimum moisture content during proofrolling. In areas which show pumping or which are otherwise unsatisfactory, undercut fill material and replace with compacted fill, or stabilize in place, as required by the architect.
- C. Proofroll areas to receive:
 - 1. Pavement.
 - 2. Building slabs on grade.

3.13 FIELD QUALITY CONTROL

- A. Testing Laboratory Services: Provide timely notice to testing laboratory, Do not proceed with construction until testing of each subgrade and lift of fill or backfill has been performed and required inspections and approvals have been obtained.
- B. Maximum Density at Optimum Moisture Content: Determine in accordance with ASTM D-1557 (Modified Proctor).
- C. In-Place Density Tests: ASTM D-1556 (sand cone method), ASTM D-2167 (rubber balloon method), or ASTM D-2922 (nuclear method), as applicable.
- D. If testing service reports indicate that subgrade or fills are below specified density, scarify or remove and replace to the required depth, recompact, and retest at no cost to the owner.

3.14 MAINTENANCE

- A. Completed Areas: Protect from damage by pedestrian or vehicular traffic, freezing, erosion, and contamination with foreign materials.
 - 1. Repair and re-establish grades to specified tolerances in settled, eroded, or rutted areas.
- B. Damaged Areas: Where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction and whether due to subsequent construction operations or weather conditions, restore materials to required conditions: Scarify or remove and replace to the required depth, return to optimum moisture content, and compact materials to the required density before continuing construction.
- C. Correction: Should settling occur within the project correction period, remove finished surfacing, add additional approved material, compact material, and reconstruct surfacing. Construct surfacing to match and blend in with adjacent surfacing as nearly as practicable.

3.15 DISPOSAL OF EXCESS WASTE AND MATERIALS

- A. Remove any material not required for use on the project (including organic strippings, trash, and debris) and legally dispose of it off the owner's property.

END OF SECTION 312000

SECTION 321123 - AGGREGATE BASE COURSES

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.
- B. Standard Specifications for Public Works Construction, 2012 Edition, as adopted by Washoe County.

1.2 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain required products from a single manufacturer.
 - 1. Accessories: Provide accessory items only as produced or recommended by manufacturer of primary products.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aggregates for Surfacing and Base:
 - 1. Aggregate shall be Type 2, Class B Aggregate Base as specified in the Standard Specifications.

2.2 SOURCE QUALITY CONTROL

- A. Testing: Perform the following testing:
 - 1. In accordance with Section 308 of the reference specifications, the contractor shall submit proof in the form of test results from an approved commercial testing laboratory that the materials proposed meet the quality and gradation requirements.

PART 3 - EXECUTION

3.1 Examination

- A. Inspect substrates and conditions under which the work of this section will be performed, and verify that installation properly may commence. Do not proceed with the work until unsatisfactory conditions have been resolved fully.

3.2 Application

- A. General: Compaction Requirements:

- 1. Material shall be compacted to minimum depth of six inches and to the following densities in accordance with ASTM D1557-78: subgrade (pavement areas and roadways): 95 percent relative compaction; base course: 95 percent relative compaction.

- B. Sub Grade:

- 1. Subgrade for base course shall be prepared in accordance with the following sections of the reference specification: 302.02, 302.04, 302.05, 302.06.

3.3 Field Quality Control

- A. Testing and Inspection: Perform the following field tests:

- 1. Owner's testing agency shall submit in the form of test results that compaction standards are being achieved as specified.

END OF SECTION 321123

SECTION 321316 - DECORATIVE CONCRETE PAVING

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. Non-colored concrete paving and concrete band.
- 2. Colored concrete paving.

- B. Related Requirements:

- 1. Section 033000 "Cast-in-Place Concrete" for general building applications of concrete.
- 2. Section 321373 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within decorative concrete paving and in joints between decorative concrete paving and other paving or adjacent construction.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.
- C. Odd-shaped panel requiring WWF: An odd-shaped panel is one in which the slab tapers to a sharp angle, when the length to width ratio exceeds 1.5, or when the slab is neither square nor rectangular. Refer to ACI330 for requirements of distributed steel for odd-shaped panels.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

- 1. Review methods and procedures related to decorative concrete paving, including but not limited to, the following:
 - a. Concrete mixture design.
 - b. Quality control of concrete materials and decorative concrete paving construction practices.
- 2. Require representatives of each entity directly concerned with decorative concrete paving to attend, including the following:
 - a. Contractor's superintendent.

- b. Independent testing agency responsible for concrete design mixtures.
- c. Ready-mix concrete manufacturer.
- d. Decorative concrete paving Installer.
- e. Manufacturer's representative of decorative concrete paving system.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each type of exposed color, pattern, or texture indicated.
- C. Design Mixtures: For each decorative concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer ready-mix concrete manufacturer and testing agency.
- B. Material Certificates: For the following, from manufacturer:
 1. Cementitious materials.
 2. Steel reinforcement and reinforcement accessories.
 3. Fiber reinforcement.
 4. Admixtures.
 5. Curing compounds.
 6. Applied finish materials.
 7. Bonding agent or epoxy adhesive.
 8. Joint fillers.
- C. Material Test Reports: For each of the following:
 1. Aggregates.
- D. Field quality-control reports.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer of decorative concrete paving systems.
 1. Provide letter of certification from the manufacturer stating that the installer is a certified applicator of special concrete finishes and is familiar with proper procedures and installation requirements of the manufacturer.
 2. Use an authorized manufacturer licensed contractor and adequate number of skilled workmen who are thoroughly trained and experienced in the necessary craft.
 3. Applicator shall be familiar with the specified requirements and the methods needed for proper performance of work of this section.

4. Applicator shall be familiar with the previously approved mock-ups that demonstrated standard of workmanship.
- B. Manufacturer Qualifications: A firm experienced in the support and training of a national installer network and manufacturing products required and listed to complete the work.
- C. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
- D. Testing Agency Qualifications: Qualified according to ASTM C1077 and ASTM E329 for testing indicated.
 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- E. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Build mockups of full-thickness sections of decorative concrete paving to demonstrate typical joints; surface color, pattern, and texture; curing; and standard of workmanship.
 2. Build mockups of decorative concrete paving in the location and of the size indicated or, if not indicated, build mockups where directed by Architect and not less than 36 inches by 96 inches .
 3. Notify Owner and Landscape Architect seven days in advance of dates and time when mock-ups will be constructed. Obtain from Owner approval of mock-ups before starting construction.
 4. If the Owner determines that the mock-ups do not meet requirements, General Contractor will demolish and remove them from the site and arrange to assemble more until approved.
 5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations in writing.
 6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing on decorative concrete paving mixtures.

1.9 FIELD CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

- B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

- C. Hot-Weather Concrete Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.2 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
 - 1. Use flexible or uniformly curved forms for curves of a radius of 100 feet or less. Do not use notched and bent forms.

- B. Forms for Textured Finish Concrete: Units of face design, size, arrangement, and configuration indicated. Provide solid backing and form supports to ensure stability of textured form liners.

- C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Fabric: CDOT Section 709 and ASTM A497, fabricated from as-drawn steel wire into flat sheets.

2.4 CONCRETE MATERIALS

A. Source Limitations:

1. Concrete: Obtain each type or class of cementitious material of the same brand from same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
2. Sand: Obtain sand determined suitable for the Sand finish Texture process be it colored from same manufacturer's plant to meet samples and mock-ups.

B. Materials:

1. Brickform Surface Deactivator or approved equivalent: Water-based reactive compound designed to retard the set of fresh concrete at the surface and holds in the mix water to achieve improved concrete properties.
2. Davis Integral Color or approval equivalent: Concentrated dry powder iron oxide pigments designed to color concrete to meet samples and mock-ups.
3. Con-Shield or approval equivalent: A topically applied Lithium Silicate hardening compound designed to improve the surface density of the sand finish product.
4. HydroLock, or approval equivalent: Topically applied sealers designed to improve stain resistance and enhance the sand finish appearance

C. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, gray portland cement Type I/II .
2. Fly Ash: ASTM C618, Class F.

D. Normal-Weight Aggregates: ASTM C33/C33M, Class 4S, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement. Use black sand in mixture. Tan sand is not acceptable.

E. Air-Entraining Admixture: ASTM C260/C260M.

F. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A , colored.

G. Color Pigment: ASTM C979/C979M, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.

H. Water: Potable and complying with ASTM C94/C94M.

2.5 FIBER REINFORCEMENT

- A. Synthetic Fiber, Monofilament Fibers: Monofilament polypropylene fibers engineered and designed for use in decorative concrete paving, complying with ASTM C1116/C1116M, Type III, 1/2 to 1-1/2 inches long.
 - 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. Euclid Chemical Company (The); an RPM company.
 - b. FORTA Corporation.
 - c. GCP Applied Technologies Inc.
 - d. Propex Operating Company, LLC.
 - e. Sika Corporation.

2.6 CURING AND SEALING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
- B. Waterborne, Membrane-Forming, Curing Compound: ASTM C309, Type 1, Class B, nondissipating, non-yellowing, manufactured for use with colored concrete.
 - 1. Curing compound shall be pigmented type matching color of integrally colored concrete and shall be approved by coloring admixture manufacturer.
 - 2. For concrete indicated to be sealed, curing compound shall be compatible with sealer.

2.7 CONCRETE MIXTURES

- A. Obtain each color, size, type, and variety of concrete mixture from single manufacturer with resources to provide concrete of consistent quality in appearance and physical properties.
- B. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
- C. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
 - 1. Fly Ash or Pozzolan: 25 percent.
- D. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
 - 1. Air Content:

- a. 4-1/2 percent plus or minus 1.5 percent for 1-inch nominal maximum aggregate size.
- E. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- F. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd. .
- G. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.
- H. Concrete Mixtures: Normal-weight concrete.
 1. Compressive Strength (28 Days): 4500 psi .
 2. Maximum W/C Ratio at Point of Placement: 0.50 .
 3. Slump Limit: 4 inches , plus or minus 1 inch.
- I. Accelerators: Do not use accelerators.

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M and ASTM C1116/C1116M. Furnish batch certificates for each batch discharged and used in the Work.
 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below decorative concrete paving to identify soft pockets and areas of excess yielding.
 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
 2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 312000 "Earth Moving."
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.
- B. Protect adjacent construction from discoloration and spillage during application of color hardeners, release agents, stains, curing compounds, and sealers.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 INSTALLATION OF STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - 1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.

2. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Expansion Joints: Form expansion joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
1. Locate expansion joints at intervals of 50 feet unless otherwise indicated.
 2. Extend joint fillers full width and depth of joint.
 3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
 7. Doweled Expansion Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- D. Control Joints: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of the concrete thickness, as follows , to match jointing of existing adjacent decorative concrete paving:
1. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
 - a. Tolerance: Ensure that sawed joints are within 3 inches in both directions from centers of dowels.
 - b. Sawcut joints in a straight line with no overcutting. For radial cuts, sawcut joints in smooth arcs with no overcutting.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating dowels and joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.7 INTEGRALLY COLORED CONCRETE FINISH

- A. Integrally Colored Concrete Finish: After final floating, apply the following finish:
 - 1. Paving, Type 2 (C.I.P. Concrete) finish
 - a. Light Sandblast finish (Monolithic Light Exposed-Aggregate Finish) or equivalent approved by Owner.
 - b. Davis Integral Color: Sandstone

3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Compound: Apply immediately after final finishing. Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.
 - 1. Cure integrally colored concrete with a pigmented curing compound.
 - 2. Cure concrete finished with pigmented mineral dry-shake hardener with a pigmented curing compound.

- E. Curing and Sealing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.9 SEALER APPLICATION

- A. Treat Sand Texture surface once cured with Con-Shield or approved equivalent as per manufacturer's instructions.
- B. After Con-Shield has reacted fully, UltraSeal or HydroLock, or approved equivalent is applied as per manufacturer's instructions.

3.10 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
 - 1. Elevation: 1/4 inch.
 - 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
 - 3. Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/2 inch.
 - 4. Lateral Alignment and Spacing of Dowels: 1 inch.
 - 5. Vertical Alignment of Dowels: 1/4 inch.
 - 6. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
 - 7. Joint Spacing: 1 inches.
 - 8. Control Joint Depth: Plus 1/4 inch, no minus.
 - 9. Joint Width: Plus 1/8 inch, no minus.

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C172/C172M shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 2. Slump: ASTM C143/C143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C231/C231M, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Concrete Temperature: ASTM C1064/C1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.

5. Compression Test Specimens: ASTM C31/C31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C39/C39M; test one specimen at seven days and two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- G. Decorative concrete paving will be considered defective if it does not pass tests and inspections.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- I. Prepare test and inspection reports.

3.12 REPAIR AND PROTECTION

- A. Remove and replace decorative concrete paving that is broken or damaged or does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
- B. Protect decorative concrete paving from damage. Exclude traffic from paving for at least 7 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- C. Maintain decorative concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321316

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Cold-applied joint sealants.
 2. Joint-sealant backer materials.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data:
1. Concrete pavement joint sealants.
 2. Joint-sealant backer materials.
- B. Samples for Verification: Actual sample of finished products for each kind and color of joint sealant required.
1. Size: Joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Paving-Joint-Sealant Schedule: Include the following information:
1. Joint-sealant application, joint location, and designation.
 2. Joint-sealant manufacturer and product name.
 3. Joint-sealant formulation.
 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Statements: For Installer .

1.5 QUALITY ASSURANCE

- A. Qualifications:
1. Installers: Entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Testing: Performed by a qualified testing agency.

1.7 FIELD 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.
 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.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain joint sealants from single manufacturer for each sealant type.

2.2 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backer materials, 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.

2.3 COLD-APPLIED JOINT SEALANTS

- A. Single-Component, Nonsag, Silicone Joint Sealant: ASTM D5893/D5893M, Type NS.
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. Crafco Inc.
 - b. Pecora Corporation.
 - c. The Dow Chemical Company.

2.4 JOINT-SEALANT BACKER MATERIALS

- A. Joint-Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.

- B. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
- C. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints 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: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on 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.

3.3 INSTALLATION OF JOINT SEALANTS

- A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions.
- C. Install joint-sealant backers to support joint 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 joint-sealant backer materials.
 - 2. Do not stretch, twist, puncture, or tear joint-sealant backer materials.

3. Remove absorbent joint-sealant backer materials that have become wet before sealant application and replace them with dry materials.
- D. Install joint sealants immediately following backer material installation, using proven techniques that comply with the following:
1. Place joint sealants so they fully contact 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.
- E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants in accordance with the following requirements 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 joint sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING AND PROTECTION

- A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.
- B. 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 and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

3.5 PAVING-JOINT-SEALANT SCHEDULE

- A. Joints within concrete paving:
1. Joint Location:
 - a. Expansion and isolation joints in concrete paving.
 - b. Contraction joints in concrete paving.
 - c. Other joints as indicated.
 2. Joint Sealant: Single-component, nonsag, silicone joint sealant .
 3. Joint-Sealant Color: TBD.

END OF SECTION 321373

SECTION 321400 - UNIT PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concrete pavers.
 - 2. Edge restraints.
- B. Related Requirements:
 - 1. Section 321313 "Concrete Paving" for concrete base under unit pavers.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data:
 - 1. For materials other than water and aggregates.
 - 2. For the following:
 - a. Pavers.
 - b. Jointing materials.
 - c. Bedding materials.
 - d. Edge restraints.
- B. Sieve Analyses: For aggregate setting-bed materials, according to ASTM C136.
- C. Samples for Initial Selection: For each type of unit paver indicated and the following:
 - 1. Joint materials involving color selection.
 - 2. Exposed edge restraints involving color selection.
- D. Samples for Verification: For full-size units of each type of unit paver indicated. Include Samples of the following:
 - 1. Joint materials.
 - 2. Exposed edge restraints.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For unit pavers. Include statements of material properties indicating compliance with requirements, including compliance with standards. Provide for each type and size of unit.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified unit paving installer. Installer's personnel assigned to the Work must have Concrete Paver Installer Certification from the Interlocking Concrete Pavement Institute (ICPI) with one of the following designations:
 - 1. Residential Paver Technician Designation.
 - 2. Commercial Paver Technician Designation.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 PRECONSTRUCTION TESTING

- 1. Use manufacturer's standard test methods to determine whether mortar and grout materials will obtain optimal adhesion with, and will be nonstaining to, installed brick and other materials constituting brick flooring installation.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

1.8 FIELD CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezin

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.
- B. Manufacturer:
 - 1. Basalite Concrete Products, LLC
 - a. Address: 355 Greg St. #201 Sparks, NV 89431
 - b. Phone: (775)358-1200

2.2 CONCRETE PAVERS

- A. Concrete Pavers, Solid Paving Units, Normal-Weight Concrete: Solid paving units made from normal-weight concrete with a compressive strength not less than 7200 psi, water absorption not more than 5 percent according to ASTM C140, and no breakage and not more than 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C67.
 - 1. Thickness: 80mm
 - 2. Face Size and Shape: 6x12 rectangle (nominal)
 - 3. Color:
 - a. Type 1: Soledad
 - b. Type 2: Morrow Bay
 - c. Type 3: Ukaiah

2.3 EDGE RESTRAINTS

- A. Steel Edge Restraints: Manufacturer's standard painted steel edging 1/4 inch thick by 3 inches high angle iron.
 - 1. Color: black

2.4 ACCESSORIES

- A. Compressible Foam Filler: Preformed strips complying with ASTM D1056, Grade 2A1.
- B. Bedding Sand: CSA A82.56, hard durable, angular particles, free from clay lumps, cementation, organic material, frozen material and the deleterious materials.
- C. Edging: as indicated on contract drawings.
- D. Filter Fabric: Mirafi 140n nonwoven polypropylene geotextile fabric
- E. Polymeric Jointing Sand:
 - 1. Product Type: Dry mix, contains polymeric binding agent, activated by water. Joint Sand Color:

2. Performance requirements:
 - a. Water resistant after 90 minutes
 - b. Applied dry – hardens after being misted.
 - c. Inhibits weed growth.
 - d. Deters ants and other insect infestation.
 - e. Resists erosion – water, frost, heaving, wind, power washing, etc.
 - f. Stabilizes pavers – strengthens interlocking
3. Sieve analyses: Most meet ASTM-C144 compliance.
4. Compressive strength is to be 800 psi (unless otherwise stated).
5. Final set time is 170 minutes.
6. Required bedding type should be drainage bed (sand-set), as recommended by the Interlocking Concrete Pavement Institute (ICPI).
7. Minimum / Maximum joint width: see drawings

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces indicated to receive unit paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Where unit paving is to be installed over waterproofing, examine waterproofing installation, with waterproofing Installer present, for protection from paving operations, including areas where waterproofing system is turned up or flashed against vertical surfaces.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.
- B. Sweep concrete substrates to remove dirt, dust, debris, and loose particles.
- C. Proof-roll prepared subgrade according to requirements in Section 312000 "Earth Moving" to identify soft pockets and areas of excess yielding. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive subbase course for unit pavers.

3.3 INSTALLATION, GENERAL

- A. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.
- B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
- C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Radial cutting and

splay cutting of pavers is required to achieve patten. Use full units without cutting where possible. Hammer cutting is not acceptable.

- D. Handle protective-coated brick pavers to prevent coated surfaces from contacting backs or edges of other units. If, despite these precautions, coating does contact bonding surfaces of brick, remove coating from bonding surfaces before setting brick.
- E. Joint Pattern: Herringbone.
- F. Tolerances:
 - 1. Do not exceed 1/16-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 24 inches and 1/4 inch in 10 feet from level, or indicated slope, for finished surface of paving.
- G. Expansion and Control Joints:
 - 1. Provide for sealant-filled joints at locations and of widths indicated. Provide compressible foam filler as backing for sealant-filled joints unless otherwise indicated; where unfilled joints are indicated, provide temporary filler until paver installation is complete. Install joint filler before setting pavers. Sealant materials and installation are specified in Section 079200 "Joint Sealants."
- H. Sand Setting Bed:
- I. Place the sand to the depth indicated on the contract drawings.
- J. Surface Course:
 - 1. Ensure the sand laying course is dry prior to placement of unit pavers.
 - 2. Install unit pavers true to grade, in location, layout and plan as indicated. Where required cut units accurately without damaging edges.
 - 3. Install pavers with 1/16" joints.
 - 4. Tamp down and level pavers with a mechanical plate vibrator on 19mm thick plywood until unit pavers are true to grade and free of movement. For vehicular traffic surfaces tamp and level pavers with a rubber tired roller.
- K. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.
 - 1. Install job-built concrete edge restraints to comply with requirements in Section 033000 "Cast-in-Place Concrete."
 - 2. Where pavers set in mortar bed are indicated as edge restraints for pavers set in aggregate setting bed, install pavers set in mortar and allow mortar to cure before placing aggregate setting bed and remainder of pavers. Cut off mortar bed at a steep angle so it will not interfere with aggregate setting bed.
- L. Polymeric Jointing Sand:
 - 1. Surface must be completely dry: Spread polymeric sand uniformly over surface. Using a push broom, sweep to fill joints completely to full depth.
 - 2. Compaction: Pass mechanical plate vibrator on sand cushion over surface course to achieve compaction of sand in joints.
 - 3. Wetting: Sweep the surface with a fine bristle brush and remove all residues with a leaf blower. Ensure that the wetting of one section is finished before another section is started. Wetting of the entire project should be done without any interruptions.
 - 4. Drying: Surface should not be exposed to rain within 90 minutes to wetting.

5. Surface of finished pavement: free from depressions exceeding 3mm as measured with a 3 m straight edge. A minimum of twenty-four (24) hours drying time is required prior to allowing foot traffic and forty-eight (48) hours for vehicular traffic on the paver surface.
6. Sweep surface course clean prior to first use. The Consultant to review surface prior to use.
7. Broom clean excess sand from finished paving stones, followed by a final water spray.

3.4 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

END OF SECTION 321400

SECTION 321540 – STONE MULCH (Landscape)

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. Cobble Mulch
 - 2. Crusher Fines

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each kind and color, provide one quart of sample.
- C. Screen Analysis Report: Submit sieve analysis report from the material supplier substantiating that the crushed aggregate intended for use on the project complies with the specified requirements.

PART 2 - PRODUCTS

2.1 COBBLE MULCH

- A. Pathway pebbles
 - 1. Supplier: R T Donovan
Address: 11600 Pyramid Way
Phone: (775)425 2015

2.2 CRUSHER FINES

- A. Crusher Fines: 3/8" Crushed (gray)
 - 1. Manufacturer: Reno Rock
Address: 3900 N. Virginia St. Reno, NV 89506
Email: info@renorock.com
Phone: (775)677-9500

2.3 RELATED MATERIALS:

- A. Landscape fabric: Nonwoven needle-punched geotextile fabric, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
 - 1. Grab Tensile Strength: 120 lbs; ASTM D4632
 - 2. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
 - 3. Permittivity: 0.5 per second, minimum; ASTM D 4491.
 - 4. UV Stability: 50 percent after 500 hours' exposure, ASTM D 4355.
 - 5. Mirafi 140-N or equivalent

PART 3 - EXECUTION

3.1 INSTALLATION – COBBLE MULCH

- A. Geotextile: Place under aggregate base as indicated in the Drawings.
 - 1. Cut to conform to base width.
- B. Overlap joints per manufacturer's instructions
- C. Spread crushed stone. Grade and smooth to the required elevation. Do not compact.

3.2 INSTALLATION – CRUSHER FINES

- A. Geotextile: Place under aggregate base as indicated in the Drawings.
 - 1. Cut to conform to base width.
 - 2. Overlap joints per manufacturer's instructions.
- B. Placing Crushed Aggregate Surface:
 - 1. Spread the mulch surfacing material in 2" lifts. Spread the mulch evenly and smoothly before compacting. Do not exceed for 20% compaction. Screed the mulch to ensure a consistent depth.
 - 2. Grade and smooth to the required elevation.

3.3 INSPECTION – CRUSHED STONE

- A. The finished surface of pavement shall be smooth and uniform.
- B. Any significant irregularities shall be smoothed out prior to final acceptance of work.
- C. Final thickness shall not vary more than 1” from dimension indicated.

3.4 INSPECTION – CRUSHER FINES

- A. The finished surface of pavement shall be smooth, uniform and solid.
 - 1. Dried compacted material shall be firm all the way through with no spongy areas.
- B. Any significant irregularities shall be smoothed out prior to final acceptance of work.
 - 1. Smoothing shall be accomplished by re-wetting and/or saturating rough areas thoroughly, and then rolling the surface again.
- C. Final thickness of completed work shall not vary more than ½ inch from dimension indicated.
 - 1. Measurements may be taken by means of test holes taken at random in finished surface.
 - 2. Correct any variations in the thickness beyond the allowable ½ inch by repeating the procedures listed.
- D. Final width of completed work shall not vary more than ½ inch from typical dimension indicated.
 - 1. Measurements may be taken at random cross sections in the finished surface.

3.5 PROTECTION AND CLEAN-UP:

- A. Protection: Protect crushed aggregate from damage until acceptance of work.
- B. Clean-up: Maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur. Wash pavement free of stains, discolorations, dirt and other foreign material and rake pavement to a smooth surface just prior to final acceptance.

END OF SECTION

SECTION 321726 - TACTILE WARNING SURFACING

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. Surface-applied detectable warning metal tiles.
- B. Related Requirements:
 - 1. Section 321313 "Concrete Paving" for concrete walkways serving as substrates for tactile warning surfacing.
 - 2. Section 321400 "Unit Paving" for unit paving installations incorporating detectable warning unit pavers specified in this Section.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of exposed finish requiring color selection.
- C. Samples for Verification: For each type of tactile warning surface, in manufacturer's standard sizes unless otherwise indicated, showing edge condition, truncated-dome pattern, texture, color, and cross section; with fasteners and anchors.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For tactile warning surfacing, to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - 2. Installer's Qualifications: Engage an experienced installer who has successfully completed installations similar in material, design, and extent to that indicated for project.

1.6 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site

1.7 PROJECT CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.
- B. Weather Limitations for Adhesive Application:
1. Apply adhesive only when ambient temperature is above 50 deg F and when temperature has not been below 35 deg F for 12 hours immediately before application. Do not apply when substrate is wet or contains excess moisture.
- C. Weather Limitations for Mortar and Grout:
1. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
 2. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Provide artificial shade and windbreaks, and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and higher.
 - a. When ambient temperature exceeds 100 deg F, or when wind velocity exceeds 8 mph and ambient temperature exceeds 90 deg F, set unit pavers within 1 minute of spreading setting-bed mortar.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of tactile warning surfaces that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering and wear.
 - b. Separation or delamination of materials and components.
 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TACTILE WARNING SURFACING, GENERAL

- A. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for tactile warning surfaces.

1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.
 2. Minimum 25% recycled content for detectable warning metal tiles
- B. Source Limitations: Obtain each type of tactile warning surfacing, anchor, and fastener from single source with resources to provide materials and products of consistent quality in appearance and physical properties.
- C. TACTILE WARNING STRIP – TYPE 1.
1. Manufacturer:
 - a. ADA solutions
Phone: (800)372-0519
Email: info@adatile.com
 - b. Approved Equal
 2. Material: homogenous glass, carbon and fiberglass reinforced composite material
 3. Color:
 - a. TBD
 4. Shapes and Sizes:
 - a. Radius panel, nominal 24 inches deep by outside radius indicated on Drawings.
 5. Dome Spacing and Configuration: Manufacturer's standard compliant spacing pattern.
 6. Mounting:
 - a. Wet-set replaceable.

2.2 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of tactile warning surfaces, noncorrosive and compatible with each material joined.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions. Verify that installation of tactile warning surfacing will comply with accessibility requirements upon completion.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF TACTILE WARNING SURFACING

- A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.
- B. Place tactile warning surfacing units in dimensions and orientation indicated. Comply with location requirements of AASHTO MP 12.

3.3 INSTALLATION OF DETECTABLE WARNING SURFACING

- A. Cast-in-Place Detectable Warning Tiles:
 - 1. Concrete Paving Installation: Comply with installation requirements in Section 321313 "Concrete Paving." Mix, place, and finish concrete to conditions complying with detectable warning tile manufacturer's written requirements for satisfactory embedment of tile.
 - 2. Install per manufacturer's instructions
 - 3. Protect exposed surfaces of installed tiles from contact with wet concrete. Complete finishing of concrete paving surrounding tiles. Remove concrete from tile surfaces.
 - 4. Clean tiles using methods recommended in writing by manufacturer.

3.4 CLEANING AND PROTECTION

- A. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise approved by Architect. Replace using tactile warning surfacing installation methods acceptable to Architect.
- B. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

END OF SECTION 321726

SECTION 321813 - SYNTHETIC GRASS SURFACING

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 synthetic grass surfacing.
- B. Related Requirements:
 - 1. Section 312000 "Earth Moving" for preparation, compaction, and grading of granular base.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For synthetic grass surfacing.
 - 1. Include sections and details.
 - 2. Show locations of seams and method of seaming.
 - 3. Show layout of game lines, numbers, and letters. Indicate application method of each line and marking.
 - 4. Show location and layout of team logo/graphics.
- C. Samples: For each type of synthetic grass surfacing indicated.
 - 1. Turf Fabric: 12 x 12" sheet
 - 2. Infill Material: 4 oz. of each type.
 - 3. Seam Sample: 24 inches square with seam centered in sample.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each synthetic grass surfacing assembly.

- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For synthetic grass surfacing, including maintenance cleaning instructions, to include in maintenance manuals.

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. Turf Fabric: Minimum of 50 sq. ft. for each type indicated.
 - 2. Infill: Minimum of two bags.
 - 3. One new set of maintenance tools, of type recommended by synthetic grass surfacing manufacturer for installation.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store materials in location and manner to allow installation of synthetic grass surfacing without excess disturbance of granular base.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace synthetic grass surfacing that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration and excessive wear.
 - b. Deterioration from UV light.
 - c. Excessive loss of shock attenuation.
 - d. Seam separation, including game lines and markings.
 - 2. Warranty Period: lifetime from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYNTHETIC GRASS SURFACING

- A. Synthetic Grass Surfacing: Complete surfacing system, consisting of synthetic yarns bound to water-permeable backing and infill indicated, suitable commercial pet waste application.
- B. Manufacturer:
 - 1. Turf Pros Solution
Address: 859 E 2nd Street
Phone: (844)-260
Office@turfprossolutions.com
 - 2. Approved Equal
- C. Turf Fabric: Imperial flush
- D. Backing: Manufacturer's standard woven or nonwoven polypropylene primary backing with urethane-coated secondary backing; provide perforations or drainage channels sufficient to meet permeability indicated.
- E. Infill: Manufacturer's silica infill or approved equal.
- F. Game Lines and Markings: Provide game lines and markers in widths and colors according to requirements indicated on Drawings.
 - 1. Application Method: Tufted into the maximum extent practicable, with remaining lines inlaid.
 - 2. Team Logo/Graphic: Provide inlaid team logo/graphic in colors and design indicated.
- G. Seaming Method: Sewn.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine base and other conditions, with Installer present, for compliance with requirements for installation tolerances, permeability, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Avoid disturbance of base during installation of turf fabric.

- B. Shock-Attenuation Pad Installation: Roll out pad and allow to relax a minimum of six hours prior to final fit and trim. Stagger head seams between adjacent rows. Fit seams snugly without stretching or forcing.
- C. Roll out turf fabric and allow to relax at least four hours prior to seaming.
- D. Provide seams flat and snug, with no gaps or fraying. Remove yarns that are trapped within seams. Attach turf fabric to perimeter restraint system as recommended by the manufacturer.
- E. Install inlaid game lines and markings by cutting through turf fabric and installing snugly fitting game line turf fabric. Provide seaming tape that extends minimum 6 inches beyond seam.
- F. Repair loose seams and bubbles formed due to expansion of turf fabric prior to installation of infill.
- G. Evenly broadcast and groom infill by machine in proportions and depth after settling as recommended by the manufacturer, and to meet indicated performance requirements. Rake fibers trapped by infill to surface.
- H. Painted Game Lines: Apply lines and markings as recommended by the game line paint manufacturer.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections:
 - 1. Permeability: 100 in./h of rainfall capacity according to ASTM F2898 or EN 15330-1.

3.4 DEMONSTRATION

- A. Train Owner's maintenance personnel in proper maintenance procedures for synthetic grass surfacing.

END OF SECTION 321813

SECTION 329113 - SOIL PREPARATION

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 planting soils specified by composition of the mixes.
- B. Related Requirements:
 - 1. Section 311000 "Site Clearing" for topsoil stripping and stockpiling.
 - 2. Section 329300 "Plants" for placing planting soil for trees, shrubs and ornamental grasses.

1.3 DEFINITIONS

- A. AAPFCO: Association of American Plant Food Control Officials.
- B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.
- C. CEC: Cation exchange capacity.
- D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.
- E. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.
- F. Imported Soil: Soil that is transported to Project site for use.
- G. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.
- H. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.
- I. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."

- J. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- K. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.
- L. SSSA: Soil Science Society of America.
- M. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- N. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- O. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- P. USCC: U.S. Composting Council.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include recommendations for application and use.
 - 2. Include test data substantiating that products comply with requirements.
 - 3. Include sieve analyses for aggregate materials.
 - 4. Material Certificates: For each type of soil amendment and fertilizer before delivery to the site, according to the following:
 - a. Manufacturer's qualified testing agency's certified analysis of standard products.
 - b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
 - c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For each testing agency.
- B. Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction Testing" Article.
- C. Field quality-control reports.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.
 - 1. Laboratories: Subject to compliance with requirements, provide testing by one of the following:
 - a. Colorado Analytical .
 - 2. Multiple Laboratories: At Contractor's option, work may be divided among qualified testing laboratories specializing in physical testing, chemical testing, and fertility testing.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil analyses on existing, on-site soil.
 - 1. Notify Architect seven days in advance of the dates and times when laboratory samples will be taken.
- B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
 - 1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.9 SOIL-SAMPLING REQUIREMENTS

- A. General: Extract soil samples according to requirements in this article.
- B. Sample Collection and Labeling: Have samples taken and labeled by Contractor in presence of Architect under the direction of the testing agency.
 - 1. Number and Location of Samples: Minimum of three representative soil samples where directed by Architect for each soil to be used or amended for landscaping purposes.
 - 2. Procedures and Depth of Samples: According to USDA-NRCS's "Field Book for Describing and Sampling Soils."
 - 3. Division of Samples: Split each sample into two, equal parts. Send half to the testing agency and half to Owner for its records.
 - 4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

1.10 TESTING REQUIREMENTS

- A. General: Perform tests on soil samples according to requirements in this article.
- B. Physical Testing:

1. Soil Texture: Soil-particle, size-distribution analysis by one of the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
 - a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
 - b. Hydrometer Method: Report percentages of sand, silt, and clay.
 2. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 3. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 4. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85% compaction according to ASTM D 698 (Standard Proctor).
- C. Chemical Testing:
1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
 2. Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1- Physical and Mineralogical Methods."
 3. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
- D. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
- E. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.
1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1000 sq. ft. for 6-inch depth of soil .
 2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1000 sq. ft. for 6-inch depth of soil .
- 1.11 DELIVERY, STORAGE, AND HANDLING
- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.
 - B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Do not move or handle materials when they are wet or frozen.
4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

PART 2 - PRODUCTS

2.1 PLANTING SOILS SPECIFIED BY COMPOSITION

- A. General: Soil amendments, fertilizers, and rates of application specified in this article are guidelines that may need revision based on testing laboratory's recommendations after preconstruction soil analyses are performed.
- B. Planting-Soil Type 1 and Planting Soil Type 2: Manufactured soil consisting of manufacturer's basic topsoil, blended in a manufacturing facility with sand, stabilized organic soil amendments, and other materials to produce viable planting soil.
 1. Additional Properties of Manufacturer's Basic Soil before Amending: Soil reaction of pH 6 to 7 and minimum of 4 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration.
 2. Unacceptable Properties: Manufactured soil shall not contain the following:
 - a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
 - b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 5 percent by dry weight of the manufactured soil.
 - c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 1-1/2 inches in any dimension.
 3. Blend manufacturer's basic soil with the following soil amendments and fertilizers in the following quantities to produce planting soil:
 - a. Ratio of Loose Compost to Soil: 1:4 by volume.
 - b. Weight of Commercial Fertilizer: 1 lbs. per cu. yd.
- C. Planting-Soil Type 3:
 1. CU-STRUCTURAL SOIL® SPECIFICATIONS 5 2.8 CU-STRUCTURAL SOIL® A. A uniformly blended urban tree mixture of crushed stone, clay loam and Gelscape® Hydrogel Tackifier, as produced by an Amereq-licensed company, mixed in the following proportion: Material Unit of Weight specified crushed Stone 100 units dry weight specified clay loam 20 – 25 units (to achieve minimum CBR of 50) Gelscape® Hydrogel Tackifier 0.035 units dry weight moisture ASTM D698/AASHTO T-99 optimum moisture.
 2. Or approved equal

2.2 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
1. Feedstock: Limited to leaves .
 2. Reaction: pH of 5.5 to 8 .
 3. Soluble-Salt Concentration: Less than 4 dS/m.
 4. Moisture Content: 35 to 55 percent by weight.
 5. Organic-Matter Content: 30 to 40 percent of dry weight.
 6. Particle Size: Minimum of 98 percent passing through a 1-inch sieve.

2.3 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

PART 3 - EXECUTION

3.1 GENERAL

- A. Place planting soil and fertilizers according to requirements in other Specification Sections.
- B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.
- C. Proceed with placement only after unsatisfactory conditions have been corrected.

3.2 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of 6 inches . Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
1. Apply, add soil amendments, and mix approximately half the thickness of unamended soil over prepared, loosened subgrade according to "Mixing" Paragraph below. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.

- C. Mixing: Spread unamended soil to total depth of 6 inches , but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
 - 1. Amendments: Apply soil amendments , except compost, and fertilizer, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.
 - a. Mix with dry soil before mixing fertilizer.
 - b. Mix fertilizer with planting soil no more than seven days before planting.
 - 2. Lifts: Apply and mix unamended soil and amendments in lifts not exceeding 8 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- D. Compaction: Compact each blended lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698 and tested in-place.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.3 APPLYING COMPOST TO SURFACE OF PLANTING SOIL

- A. Application: Apply compost component of planting-soil mix to surface of in-place planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Finish Grading: Grade surface to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Soil will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.
- D. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.

3.5 PROTECTION

- A. Protection Zone: Identify protection zones according to Section 015639 "Temporary Tree and Plant Protection."
- B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Vehicle traffic.

4. Foot traffic.
 5. Erection of sheds or structures.
 6. Impoundment of water.
 7. Excavation or other digging unless otherwise indicated.
- C. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Architect and replace contaminated planting soil with new planting soil.

3.6 CLEANING

- A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.
 1. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.

END OF SECTION 329113

SECTION 329300 - PLANTS

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. Plants.
 - 2. Tree stabilization.
- B. Related Requirements:
 - 1. Section 329113 – Synthetic Grass Surfacing
 - 2. Section 328400 - Planting Irrigation
 - 3. Section 329113 – Soil Preparation

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."
- B. Unit prices apply to authorized work covered by quantity allowances.
- C. Unit prices apply to additions to and deletions from the Work as authorized by Change Orders.

1.4 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than sizes indicated diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required.
- D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than the minimum root spread according to ANSI Z60.1 for type and size of plant required.

- E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
- F. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.
- G. Finish Grade: Elevation of finished surface of planting soil.
- H. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.
- I. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- J. Planting Area: Areas to be planted.
- K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation" for drawing designations for planting soils.
- L. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- M. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- N. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
- O. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed. Insert other definitions if required to support planting requirements indicated on Drawings.

1.5 COORDINATION

- A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
 - 1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.6 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.7 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
2. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

- B. Samples for Verification: For each of the following:

1. Trees and Shrubs: 12 Samples of each variety and size delivered to site for review. Maintain approved Samples on-site as a standard for comparison.
2. Organic Mulch: 1-pint volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
3. Mineral Mulch: 2 lb of each mineral mulch required, in sealed plastic bags labeled with source of mulch. Sample shall be typical of the lot of material to be delivered and installed on-site; provide an accurate indication of color, texture, and makeup of the material.
4. Proprietary Root-Ball-Stabilization Device: One unit.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
1. Manufacturer's certified analysis of standard products.
 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- C. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.
- D. Sample Warranty: For special warranty.

1.9 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

1.10 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.
1. Professional Membership: Installer shall be a member in good standing of either the National Association of Landscape Professionals or AmericanHort.
 2. Experience: Five years' experience in landscape installation in addition to requirements in Section 014000 "Quality Requirements."
 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 4. Personnel Certifications: Installer's personnel assigned to the Work shall have certification in one of the following categories from the National Association of Landscape Professionals:
 - a. Landscape Industry Certified Technician - Exterior.
 - b. Landscape Industry Certified Interior.
 - c. Landscape Industry Certified Horticultural Technician.
 5. Pesticide Applicator: State licensed, commercial.
- B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
1. Selection of plants purchased under allowances is made by Landscape Architect, who tags plants at their place of growth before they are prepared for transplanting.
- C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
 2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
- D. Plant Material Observation: Landscape Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Landscape Architect may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
1. Notify Landscape Architect of sources of planting materials seven days in advance of delivery to site.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.
- B. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Accompany each delivery of bulk materials with appropriate certificates.
- C. Deliver bare-root stock plants within 24 hours of digging. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting. Transport in covered, temperature-controlled vehicles, and keep plants cool and protected from sun and wind at all times.
- D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- E. Handle planting stock by root ball.
- F. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
- G. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
 - 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
- H. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.
- I. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
 - 1. Heel-in bare-root stock. Soak roots that are in less than moist condition in water for two hours. Reject plants with dry roots.
 - 2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
 - 3. Do not remove container-grown stock from containers before time of planting.

4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

1.12 FIELD CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
 1. Spring Planting: April 15 – June 15.
 2. Fall Planting: August 15 – October 15.
- C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.13 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
 - b. Structural failures including plantings falling or blowing over.
 - c. Faulty performance of tree stabilization.
 - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 2. Warranty Periods: From date of planting completion.
 - a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
 - b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
 - c. Annuals: Two months.
 3. Include the following remedial actions as a minimum:
 - a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
 - b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.

- d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
 1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable.
 2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
- B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.
- C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- D. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.
- E. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.
- F. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery.

2.2 FERTILIZERS

- A. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.
 1. Size: 10-gram tablets.

2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

2.3 PESTICIDES

- A. General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

D. TREE STABILIZATION MATERIALS:

B. Biodegradable Stake

1. Manufacturer: Arborstakes
2. Website: www.arborstakes.com
3. Quantity as specified (per tree basis)
4. Wooden dowel rods meeting >6% moisture content. ASTM D4442
5. Length 40" (inches) – Typical planting conditions
6. Diameter 22.2mm (millimeters)

C. Biodegradable Lock

1. Manufacturer: Arborstake
2. Website: www.arborstakes.com
3. (1) per Biodegradable Stake (above)
4. TOTAL HEIGHT NOT TO EXCEED 1" FROM TOP OF ROOT BALL

2.4 MISCELLANEOUS PRODUCTS

- A. Wood Pressure-Preservative Treatment: AWWA U1, Use Category UC4a; acceptable to authorities having jurisdiction, and containing no arsenic or chromium.
- B. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
- C. Burlap: Non-synthetic, biodegradable.
- D. Planter Drainage Gravel: Washed, sound crushed stone or gravel complying with ASTM D448 for Size No. 8.
- E. Planter Filter Fabric: Woven geotextile manufactured for separation applications and made of polypropylene, polyolefin, or polyester fibers or combination of them.

- F. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
 - 3. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 4. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Landscape Architect and replace with new planting soil.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.
- D. Lay out plants at locations directed by Landscape Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

3.3 PLANTING AREA ESTABLISHMENT

- A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation."
- B. Placing Planting Soil: Place and mix planting soil in-place over exposed subgrade.

- C. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
- D. Application of Mycorrhizal Fungi: At time directed by Landscape Architect, broadcast dry product uniformly over prepared soil at application rate according to manufacturer's written recommendations.

3.4 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate circular planting pits.
 - 1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
 - 2. Excavate approximately three times as wide as ball diameter for balled and burlapped and container-grown stock.
 - 3. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
 - 4. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
 - 5. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
 - 6. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
 - 7. Maintain supervision of excavations during working hours.
 - 8. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
 - 9. If drain tile is indicated on Drawings or required under planting areas, excavate to top of porous backfill over tile.
- B. Backfill Soil: Subsoil and topsoil removed from excavations may not be used as backfill soil unless otherwise indicated.
- C. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
 - 1. Hardpan Layer: Drill 6-inch-diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.
- D. Drainage: Notify Landscape Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.
- E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE, SHRUB, AND VINE PLANTING

- A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
- B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Balled and Burlapped and Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades.
 - 1. Backfill: Planting soil. For trees, use excavated soil for backfill.
 - 2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
 - 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 - 4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
 - a. Quantity: Two per plant.
 - 5. Continue backfilling process. Water again after placing and tamping final layer of soil.
- D. Fabric Bag-Grown Stock: Set each plant plumb and in center of planting pit or trench with root Retain "Watering Pipe" Paragraph below if required; coordinate with Drawing details. Generally, delete paragraph if slow-release watering device is required in "Installing Slow-Release Watering Device" Article.
- E. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.6 MECHANIZED TREE-SPADE PLANTING

- A. Trees may be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, balled-and-burlapped root-ball diameter according to ANSI Z60.1, or larger than manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.
- B. Use the same tree spade to excavate the planting hole as will be used to extract and transport the tree.
- C. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.

- D. Cut exposed roots cleanly during transplanting operations.
- E. Plant trees following procedures in "Tree, Shrub, and Vine Planting" Article.
- F. Where possible, orient the tree in the same direction as in its original location.

3.7 TREE, SHRUB, AND VINE PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune for shape.
- B. Prune, thin, and shape trees, shrubs, and vines as directed by Landscape Architect.
- C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Landscape Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- D. Do not apply pruning paint to wounds.

3.8 TREE STABILIZATION

- A. Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless otherwise indicated:
 - 1. Upright Staking and Tying:
 - a. Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend one-third of trunk height above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
 - b. Stake trees with two stakes for trees up to 12 feet high and 2-1/2 inches or less in caliper; three stakes for trees less than 14 feet high and up to 4 inches in caliper. Space stakes equally around trees.
 - 2. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
 - 3. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
- B. Place a layer of drainage gravel at least 4 inches thick in bottom of planter. Cover bottom with filter fabric and wrap filter fabric 6 inches up on all sides. Duct tape along the entire top edge of the filter fabric, to secure the filter fabric against the sides during the soil-filling process.
- C. Fill planter with planting soil. Place soil in lightly compacted layers to an elevation of 1-1/2 inches below top of planter, allowing natural settlement.

3.9 GROUND COVER AND PLANT PLANTING

- A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on Drawings in even rows with triangular spacing.
- B. Use planting soil for backfill.
- C. Dig holes large enough to allow spreading of roots.
- D. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to a depth not less than two nodes.
- E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.10 PLANTING AREA MULCHING

- A. Mulch backfilled surfaces of planting areas and other areas indicated.
 - 1. Organic Mulch in Planting Areas: Apply 3-inch average thickness of organic mulch over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.11 PLANT MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.
- B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.12 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

- B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Do not apply to seeded areas.
- C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.13 REPAIR AND REPLACEMENT

- A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Landscape Architect.
 - 1. Submit details of proposed pruning and repairs.
 - 2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
 - 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Landscape Architect.
- B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Landscape Architect determines are incapable of restoring to normal growth pattern.
 - 1. Provide new trees of same size as those being replaced for each tree of 4 inches or smaller in caliper size.
 - 2. Provide one new tree(s) of 4-inch caliper size for each tree being replaced that measures more than 4 inches in caliper size.
 - 3. Species of Replacement Trees: Species selected by Landscape Architect.

3.14 CLEANING AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.
- C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- D. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.
- E. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

3.15 MAINTENANCE SERVICE

- A. Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:
 - 1. Maintenance Period: 12 months from date of planting completion.

- B. Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:
 - 1. Maintenance Period: 12 months from date of planting completion.

END OF SECTION 329300

SECTION 334100-STORM UTILITY 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.
- B. Standard Specifications for Public Works Construction, 2012 Edition, as adopted by Washoe County.
- C. Geotechnical Investigation Report, “Geotechnical Investigation Sparks Forecourt, Sparks, Nevada”, prepared by Black Eagle Consulting, Inc., April 8, 2022.

1.2 SUMMARY

- A. The project requirements for storm utility drainage piping shall be those specified in Section 306 – Storm Drain, Culverts, and Sanitary Sewer Construction, of the Standard Specifications for Public Works Construction, 2012 edition, the requirements stated herein and the requirements shown on the contract documents.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials shall conform to the Plans and Standard Specifications for Public Works Construction, 2012 Edition.
- B. PVC pipe to be used for storm utility drainage piping systems shall meet the requirements of ASTM Specification D-3034, SDR 35 with bell and spigot type rubber-gasket joint.
- C. Ductile iron pipe used for storm utility drainage piping shall meet the requirements of ANSI/AWWA C151/A21.51, Pressure Class 150. Ductile iron pipe shall be poly encased per ANSI/AWWA C105, Method A.
- D. Corrugated high density polyethylene (CHDPE) pipe ASTM specification D-3350 Type S (smooth interior lining)
- E. The Contractor shall submit all products for approval by the Architect at least 14 days prior to the proposed installation date.

PART 3 - EXECUTION

3.1 REQUIREMENTS

- A. The requirements of Section 306 – Storm Drain, Culverts, and Sanitary Sewer Construction, of the Standard Specifications for Public Works Construction, Latest Edition, shall be incorporated into and made part of the project contract documents.

END OF SECTION 334100

Apprenticeship Utilization Act Information and Forms

APPRENTICESHIP UTILIZATION ACT

BACKGROUND

Senate Bill 207 (Apprenticeship Utilization Act) passed during the 2019 Legislative Session added sections 338.0116 and 338.01165 to the NRS. These new provisions apply to bids for public works where the value exceeds \$100,000.00. In passing SB 207, The Legislature hereby finds and declares that: (1) A skilled workforce in construction is essential to the economic well-being of the State; (2) Apprenticeship programs are a proven method of training a skilled workforce in construction; and (3) Requiring the use of apprentices on the construction of public works will ensure the availability of a skilled workforce in construction in the future for this State.

A contractor or subcontractor engaged in **horizontal construction** who employs a worker on a public work pursuant to NRS 338.040 shall use one or more apprentices for at least 3 percent of the total hours of labor worked for each apprenticed craft or type of work to be performed on the public work for which more than three workers are employed.

“Horizontal Construction” means the construction of any fixed work, including any irrigation, drainage, water supply, flood control, harbor, railroad, highway, tunnel, airport or airway, sewer, sewage disposal plant or water treatment facility and any ancillary vertical components thereof, bridge, inland waterway, pipeline for the transmission of petroleum or any other liquid or gaseous substance, pier, and work incidental thereto. The term does not include vertical construction, the construction of any terminal or other building of an airport or airway, or the construction of any other building.

A contractor or subcontractor engaged in **vertical construction** who employs a worker on a public work pursuant to NRS 338.040 shall use one or more apprentices for at least 10 percent of the total hours of labor worked for each apprenticed craft or type of work to be performed on the public work for which more than three workers are employed.

“Vertical Construction” means the construction or remodeling of any building, structure or other improvement that is predominantly vertical, including, without limitation, a building, structure or improvement for the support, shelter and enclosure of persons, animals, chattels or movable property of any kind, and any improvement appurtenant thereto.

A Public Body/Awarding Body, upon the request of a contractor or subcontractor, **MAY** submit a request for a modification or waiver of the percentage of hours of labor of one or more apprentices prior to (1) the bid advertisement; (2) the bid opening; or (3) the award of the contract if, “Good Cause” exists. The Labor Commissioner may also grant a modification or waiver from the requirements of NRS 338.01165 after work on the public work has commenced.

CITY OF SPARKS – OPERATIONAL PROCESS FOR COMPLIANCE (POST-BID)

The timeline associated with initial collection of materials associated with compliance with the Apprenticeship Utilization Act (“the Act”) is as follows:

Pre-Award Meeting – Following the public opening of bids (as soon as practical), a meeting will be scheduled with the apparent low bidder to discuss the bidder’s ability to meet the requirements of the Act. At this meeting, the contractor will provide a “Project Workforce Checklist” that indicates the expected classification of workers on the project and the determination as to whether or not apprentices may be required per the provisions of the Act.

Determination of Availability of Apprentices

Immediately following the Pre-Award Meeting, the low bidder will survey the market to determine whether there are a sufficient number of apprentices available in the jurisdiction to meet the requirements of the Act, specific to the project at-hand. The contractor will then communicate the results of this survey to the City of Sparks by either indicating they can go forward without further action by the City or by delivering a completed “Apprenticeship Utilization Act Waiver Request” form(s) for consideration by the City and the Nevada Labor Commissioner.

Communications concerning compliance and/or delivery of waiver requests should occur within 14 calendar days of the Pre-Award Meeting.

Waiver Requests

Upon receipt of any waiver requests, the City will consider the materials provided and, as required, forward the materials to the Nevada Labor Commissioner for consideration and possible approval. Upon receipt of that determination, the City of Sparks will communicate the results back to the Contractor as soon as possible.

Contract Award

Once the City and the low bidder have completed the work required to determine the apparent compliance with the Act, the award of the construction contract will be scheduled for consideration by the City Council.

Post-Award Requests

As allowed by the Act, should an awarded Contractor determine in the course of a project that their ability to comply with the requirements of the Act has changed, additional waiver requests or other relevant information should be communicated to the City as soon as practical for further action and consideration by the City and/or the Nevada Labor Commissioner.

Sample Forms

Additional information and sample forms for use in compliance with the Act may be found on the website of the Nevada Labor Commissioner at:

http://labor.nv.gov/Apprenticeship_Utilization_Act/Apprenticeship_Utilization_Act/

This information may also be found following this page and include:

- 1) Apprenticeship Utilization Guide
- 2) Apprenticeship Verification Process
- 3) Project Workforce Checklist
- 4) Request for Apprentice Availability on a Public Work
- 5) Apprenticeship Utilization Act Waiver Request

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GOVERNOR

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REVISED NOVEMBER 29, 2021

(Originally issued on January 28, 2020)

ADVISORY OPINION - NEVADA ADMINISTRATIVE CODE § 607.650

SENATE BILL 207 - APPRENTICESHIP UTILIZATION ACT (AUA)

Pursuant to Nevada Administrative Code (NAC) Section 607.650, the Labor Commissioner is issuing the following Advisory Opinion regarding Senate Bill (SB) 207/Apprenticeship Utilization Act (AUA). The Labor Commissioner has received multiple inquiries, opinion requests, comments, suggestions, and proposals on how Senate Bill 207 should be interpreted, implemented, and enforced. The Labor Commissioner also met with various stakeholders.

This Advisory Opinion is intended to provide as much guidance as possible on Senate Bill 207. However, it must be recognized that not every working environment or situation may be encompassed by the answers and guidance set forth in this Advisory Opinion. The Labor Commissioner will continue to work with stakeholders, public/awarding bodies, contractors/subcontractors, and employers and employees on Senate Bill 207. However, the Labor Commissioner will attempt to interpret, implement, and enforce Senate Bill 207 based on the plain language of the bill and the intent of the Legislative Sponsors of the bill to ensure that apprenticeship utilization takes place on public works projects in the State of Nevada.

KEY HIGHLIGHTS OF SENATE BILL (SB 207) – EFFECTIVE JANUARY 1, 2020

The Legislature hereby finds and declares that: 1. A skilled workforce in construction is essential to the economic well-being of this State; 2. Apprenticeship programs are a proven method of training a skilled workforce in construction; and 3. Requiring the use of apprentices on the construction of public works will ensure the availability of a skilled workforce in construction in the future for this State.

Sec. 1.7. 1. Notwithstanding any other provision of this chapter and except as otherwise provided in this section, a contractor or subcontractor engaged in vertical construction who employs a worker on a public work pursuant to NRS 338.040 shall use one or more apprentices for at least 10 percent of the total hours of labor worked for each apprenticed craft or type of work to be performed on the public work for which more than three workers are employed.

2. Notwithstanding any other provision of this chapter and except as otherwise provided in this section, a contractor or subcontractor engaged in horizontal construction who employs a worker on a public work pursuant to NRS 338.040 shall use one or more apprentices for at least 3 percent of the total hours of labor worked for each apprenticed craft or type of work to be performed on the public work for which more than three workers are employed.

<https://www.leg.state.nv.us/App/NELIS/REL/80th2019/Bill/6351/Text>

DEFINITIONS FOR PUBLIC BODY AND PUBLIC WORK AND AWARDING BODY NEVADA REVISED STATUTES (NRS) SECTIONS 338.010(17)(18) AND NEVADA ADMINISTRATIVE CODE (NAC) SECTION 338

17. “Public body” means the State, county, city, town, school district or any public agency of this State or its political subdivisions sponsoring or financing a public work.

18. “Public work” means any project for the new construction, repair or reconstruction of a project financed in whole or in part from public money for:

- (a) Public buildings;
- (b) Jails and prisons;
- (c) Public roads;
- (d) Public highways;
- (e) Public streets and alleys;
- (f) Public utilities;
- (g) Publicly owned water mains and sewers;
- (h) Public parks and playgrounds;
- (i) Public convention facilities which are financed at least in part with public money; and
- (j) All other publicly owned works and property.

NAC 338.0054 “Awarding body” defined. ([NRS 338.012](#)) “Awarding body” means a public body, as that term is defined in [NRS 338.010](#), or any authorized agent or representative of a public body.

DEFINITIONS FOR HORIZONTAL AND VERTICAL CONSTRUCTION NRS 338.010(13)(24) – SENTATE BILL 141 (2021)

Horizontal Construction NRS 338.010 - Subdivision 13. “Horizontal construction” means any construction, alteration, repair, renovation, demolition or remodeling necessary to complete a public work, including , without limitation, any irrigation, drainage, water supply, flood control, harbor, railroad, highway, tunnel, airport or airway, sewer, sewage disposal plant or water treatment facility and any ancillary vertical components thereof, bridge, inland waterway, pipeline for the transmission of petroleum or any other liquid or gaseous substance, pier, and any other work incidental thereto. The term does not include vertical construction, the construction of any terminal or other building of an airport or airway, or the construction of any other building.

Vertical Construction NRS 338.010 - Subdivision 24. “Vertical construction” means any construction, alteration, repair, renovation, demolition or remodeling necessary to complete a public work for any building, structure or other improvement that is predominantly vertical, including, without limitation, a building, structure or improvement for the support, shelter and enclosure of persons, animals, chattels or movable property of any kind, and any other work or improvement appurtenant thereto.

WHAT IS COMPLEX AND/OR HAZARDOUS?

Tasks routinely and customarily performed by an apprentice in an apprenticed craft or type of work, unless specifically prohibited by the applicable Apprenticeship Program or Apprenticeship Standards, are not considered to be either uniquely hazardous or complex tasks for the purpose of enforcement of the provisions of Senate Bill 207 and any regulations adopted pursuant thereto.

SENATE BILL 207 ONLY APPLIES TO PUBLIC WORKS PROJECTS OF \$100,000 OR MORE.

Assembly Bill 136 passed during the 2019 Nevada Legislative Session changed the public works project amount that triggers prevailing wage laws from \$250,000 to \$100,000. The Sponsor of Senate Bill 207, Senator Brooks, stated that the intent of Senate Bill 207 was to apply to public works projects based on prevailing wage laws and the amount that triggers prevailing wage laws. The Legislature determined that amount to be \$100,000. Therefore, Senate Bill 207 only applies to public works projects of \$100,000 or more.

SENATE BILL 207 DOES NOT APPLY TO DAVIS-BACON OR 100% FEDERALLY FUNDED PROJECTS.

Senate Bill 207 is a state law that applies to state public works projects based on the definition set forth above in NRS Section 338.010 subdivision 17.

Senate Bill 207 does not apply to 100% federally funded projects and/or those projects that fall exclusively under the federal Davis-Bacon Act requirements for compliance and/or enforcement.

For projects that have a mix of state and federal funding, the public/awarding body should include the provisions of Senate Bill 207 as part of their bid documents and apply Senate Bill 207 on those projects.

The public/awarding body can work with their federal funding agencies and seek a determination from them as to whether Senate Bill 207 should apply based on the funding structure of the project. The Labor Commissioner will consider this information in determining whether Senate Bill 207 applies on those types of projects.

THE LABOR COMMISSIONER DOES NOT HAVE JURISDICTION OVER AND WILL NOT ENFORCE “ON-THE-JOB TRAINING”/OJT REQUIREMENTS IF THE AUA APPLIES.

Assembly Bill 459 passed during the 81st Regular Session of the Nevada Legislature (2021) moved the jurisdiction of the Nevada State Apprenticeship Council back to the Office of the Labor Commissioner and designated the Office of the Labor Commissioner as the recognized State Apprenticeship Agency.

Projects that require compliance with the AUA and fall under the jurisdiction and enforcement of the Labor Commissioner will be required to meet the requirements of the AUA. The Labor Commissioner will not apply and/or enforce additional “on-the-job”/OJT requirements and public/awarding bodies should not enforce additional OJT requirements if state law, the AUA applies.

Pursuant to Nevada Revised Statutes (NRS) sections 610.020 and 610.144, and Nevada Administrative Code (NAC) section 610.540, state registered apprenticeship programs must already comply with the following requirements related to equal opportunity, affirmative action, selection methods, and a nondiscriminatory pool for application as an apprentice.

NRS 610.020 Purposes. The purposes of this chapter are:

1. To open to people, without regard to race, color, creed, sex, sexual orientation, gender identity or expression, religion, disability, genetic information, national origin or age of 40 years or older, the opportunity to obtain training that will equip them for profitable employment and citizenship.
2. To establish, as a means to this end, an organized program for the voluntary training of persons under approved standards for apprenticeship, providing facilities for their training and guidance in the arts and crafts of industry and trade, with instruction in related and supplementary education.
3. To promote opportunities for employment for all persons, without regard to race, color, creed, sex, sexual orientation, gender identity or expression, religion, disability, genetic information, national origin or age of 40 years or older, under conditions providing adequate training and reasonable earnings.
4. To regulate the supply of skilled workers in relation to the demand for skilled workers.
5. To establish standards for the training of apprentices in approved programs.
6. To establish a State Apprenticeship Council.
7. To provide for a State Apprenticeship Director with the authority to carry out the purposes of this chapter.
8. To provide for reports to the Legislature and to the public regarding the status of the training of apprentices in the State.
9. To accomplish related ends.

NRS 610.144 Requirements for program to be eligible for registration and approval by State Apprenticeship Council.

1. Be an organized, written plan embodying the terms and conditions of employment, training and supervision of one or more apprentices in an occupation in which a person may be apprenticed and be subscribed to by a sponsor who has undertaken to carry out the program.
2. Contain the pledge of equal opportunity prescribed in 29 C.F.R. § 30.3(c) and, when applicable:
 - (a) A plan of affirmative action in accordance with 29 C.F.R. § 30.4;
 - (b) A method of selection authorized in 29 C.F.R. § 30.10;
 - (c) A nondiscriminatory pool for application as an apprentice; or
 - (d) Similar requirements expressed in a state plan for equal opportunity in employment in apprenticeships adopted pursuant to 29 C.F.R. Part 30 and approved by the United States Department of Labor.

NAC 610.540 Standards: Pledge of equal opportunity. ([NRS 610.090](#), [610.144](#)) Each sponsor shall include in its standards a pledge of equal opportunity which is worded substantially as follows:

The recruitment, selection, employment and training of apprentices during apprenticeship will be without discrimination because of race, color, religion, sex, sexual orientation, age, disability or national origin. The sponsor will take affirmative action to provide equal opportunity in apprenticeship and will operate the program of apprenticeship as required under Title 29 of the Code of Federal Regulations, Part 30, and all regulations on equal opportunity of employment in the State of Nevada.

[Apprenticeship Council, Equal Employment Opportunity, § 4 subsec. (b), eff. 9-11-76] (NAC A by R082-04, 7-13-2004)

THE LABOR COMMISSIONER TYPICALLY DOES NOT HAVE JURISDICTION OVER THE BIDDING PROCESS.

NRS section 338.013 requires an identifying number from the Labor Commissioner. Please see below.

NRS 338.013 Inclusion of identifying number from Labor Commissioner in advertisement or solicitation and bids and other responsive documents; reports by public bodies and contractors to Labor Commissioner.

1. A public body that undertakes a public work shall request from the Labor Commissioner and include in any advertisement or other type of solicitation, an identifying number with a designation of the work. That number must be included in any bid or other document submitted in response to the advertisement or other type of solicitation.
2. Each public body which awards a contract for any public work shall report its award to the Labor Commissioner within 10 days after the award, giving the name and address of the contractor to whom the public body awarded the contract and the identifying number for the public work.
3. Each contractor engaged on a public work shall report to the Labor Commissioner and the public body that awarded the contract the name and address of each subcontractor whom the contractor engages for work on the project within 10 days after the subcontractor commences work on the contract and the identifying number for the public work.
4. The public body which awarded the contract shall report the completion of all work performed under the contract to the Labor Commissioner before the final payment of money due the contractor by the public body.

The bidding requirements and provisions set forth in NRS 338.1373 et seq. fall under the jurisdiction of the public/awarding bodies, with limited exceptions where the Labor Commissioner can get involved in the bidding and award of contracts if potential violations of prevailing wage and public works laws may be occurring.

Therefore, each public/awarding body is encouraged to work with their respective attorneys/counsel to develop forms and a process to implement Senate Bill 207. Examples and guidance have been provided on how to include the requirements of Senate Bill 207 in bid documents and in determining what is a responsive bid. The Labor Commissioner will not take over or assume any of the bidding and award duties of the public/awarding body as required by existing laws and regulations.

DEFINITION OF APPRENTICE NAC 338.

NAC 338.0052 “Apprentice” defined. ([NRS 338.012](#)) “Apprentice” means a person employed and individually registered in a bona fide apprenticeship program with:

1. The Bureau of Apprenticeship and Training of the Office of Apprenticeship, Training, Employer and Labor Services of the Employment and Training Administration of the United States Department of Labor or its successor; and
2. The State Apprenticeship Council pursuant to [chapter 610](#) of NRS and any regulations adopted pursuant thereto.

THERE ARE NO REGISTERED APPRENTICESHIP PROGRAMS IN MY JURISDICTION.

A Request for Waiver may be submitted by the public/awarding body. Please follow the link to the Advisory Opinion on “Jurisdiction(s)” for purposes of Senate Bill 207.

http://labor.nv.gov/uploadedFiles/labornvgov/content/Apprenticeship_Utilization_Act/AO-2019-03%20AUA%20Jurisdiction%20definition.pdf

DOES THE AWARDING BODY STILL NEED TO REQUEST A WAIVER IF THERE IS NO REGISTERED APPRENTICESHIP PROGRAM IN THE JURISDICTION?

Yes, a Request for Waiver still needs to be submitted.

However, the Labor Commissioner will not require a Request for Waiver for the Truck Driver Job Classification in the State of Nevada because there currently are no Registered Apprenticeship Programs for Truck Drivers in the State of Nevada, and because of the volume of waivers that could be generated simply for the Truck Driver Job Classification.

HOW MANY APPRENTICESHIP PROGRAMS DO I HAVE TO REQUEST APPRENTICES FROM?

A contractor/subcontractor that has more than three workers employed on a public work within the same apprenticed craft or type of work needs to request apprentices from every Registered Apprenticeship Program for that craft or type of work performed in their jurisdiction. This could include requesting apprentices from both a Union Apprenticeship Program and a Non-Union Apprenticeship Program. (See above for Advisory Opinion on “Jurisdiction(s)” for purposes of Senate Bill 207)

For example, the Laborers Job Classification and Job Description may also include Brick and Hod Plaster Carriers, Flaggers, Cement Masons, Fence Erectors, Asbestos Abatement, and Landscaping. Similarly, the Carpenters Job Classification and Job Description may also include different types of work performed. The Labor Commissioner will likely view each different Job Description within the broader Job Classification as separate crafts or types of work for purposes of SB207.

The contractor/subcontractor should identify the craft or type of work to be performed and determine how that work is bid and assigned according to area practice and within that jurisdiction. The Labor Commissioner does not have jurisdiction over jurisdictional disputes involving collective bargaining agreements where contractors/subcontractors and/or the Unions are claiming a type of work that has been assigned according to area practice and is set forth in the collective bargaining agreements.

Please also see the sample Project Workforce Checklist on the link below.

http://labor.nv.gov/Apprenticeship_Utilization_Act/Apprenticeship_Utilization_Act/

WHAT HAPPENS IF THE DISPATCHED APPRENTICE DOES NOT SHOW UP OR THERE ARE OTHER ISSUES WITH THE APPRENTICE?

The contractor/subcontractor should contact the Registered Apprenticeship Program and notify them that the apprentice did not show up. The contractor/subcontractor should also document the incident and notify the prime contractor and/or public/awarding body of the situation.

Apprenticeship questions, issues and/or complaints regarding Registered Apprenticeship Programs and the verification and/or qualifications and/or work of an Apprentice that is dispatched should be directed to the Registered Apprenticeship Program first. Additional information can be found at https://labor.nv.gov/Wages/Nevada_State_Apprenticeship_Council/.

WHAT HAPPENS IF THE CONTRACTOR/SUBCONTRACTOR IS ONLY GOING TO HAVE MORE THAN 3 WORKERS PER CRAFT OR TYPE OF WORK TO BE PERFORMED FOR ONE DAY OR A LIMITED PERIOD OF TIME?

The Labor Commissioner cannot possibly address every individual situation that could arise on a public works jobsite. If a contractor/subcontractor is required or finds the need to bring on additional workers that triggers the requirements of Senate Bill 207, the contractor/subcontractor should make every effort to bring on an apprentice to comply with the requirements of Senate Bill 207.

The Labor Commissioner also recognizes that there may be situations where the contractor/subcontractor only has more than 3 workers within a specific apprenticed craft or type of work for a day or for a limited period where it may not be reasonable and/or practical to request and/or obtain apprentice(s). The contractor/subcontractor should document the reason for the increase in workers and why it was necessary, and work with the prime contractor and/or public/awarding body to determine if the increase in workers will be temporary or a long-term situation.

The contractor/subcontractor should then determine if the contractor/subcontractor needs to request apprentices or if the public/awarding body should seek a Request for Waiver from the Labor Commissioner. In situations like this, the Labor Commissioner may look at the project as a whole and will review the actions of the contractor/subcontractor and public/awarding body to determine if their actions were reasonable and not an attempt to circumvent the requirements of Senate Bill 207.

In addition, in cases of emergencies, the law provides an exemption to prevailing wage requirements, and therefore the requirements of Senate Bill 207. (See also NRS sections 338.011 and 338.090.)

HOW WILL SENATE BILL 207 BE ENFORCED?

The plain language of Senate Bill 207 provides that it will be enforced contractor by contractor, subcontractor by subcontractor, and project by project. Therefore, the general/prime contractor cannot satisfy the 10% or 3% requirement on the project for all their subcontractors. If a subcontractor has more than 3 workers for an apprenticed craft or a type of work performed, they will need to comply with the

requirements of Senate Bill 207 separately. Similarly, a general/prime contractor that has more than 3 workers within an apprenticed craft or type of work performed will need to comply with the requirements of Senate Bill 207 separately.

So, for example, if you have 4 Electricians who each work a 40-hour week, $40 \times 4 = 160$, and that was the total hours they worked on the entire project. Because there were more than 3 workers per craft or type of work performed that would trigger the requirements of Senate Bill 207. Depending upon whether it was Vertical Construction = 10% or Horizontal Construction = 3% of the total hours of the project for that craft or type of work performed would have to be hours worked by an Apprentice based on the 160 total project hours.

It is important to look at and recognize the craft or the type of work performed. For example, the Flagger Job Classification is listed as separate, but the assignment of this work typically falls under the Laborers through collective bargaining agreements and area practice. However, a Flagger performs a distinct type of work from a general Laborer. So, if there are more than 3 Flaggers on a public works jobsite, there will need to be an apprentice on the jobsite for that craft or type of work performed, or a waiver obtained. Senate Bill 207 specifically specifies “craft” or “type of work performed.” Prevailing wage laws require that workers are paid based on the type of work the worker actually performs. Senate Bill 207 reinforces this requirement by requiring apprentices specifically for the craft or type of work performed.

The Laborer and Operator Job Classifications contain Groups. The Groups will not be considered separately but will be counted together towards the more than 3 workers threshold. As stated above, exceptions to this could be Laborers if they are performing a separate and distinct type of work, such as a Flagger. If there is an Operator Group 1 worker, an Operator Group 2 worker, an Operator Group 4 worker, and an Operator Group 5 worker, they will all be counted together as 4 Operators, thereby triggering the requirements of Senate Bill 207.

There may be situations where the Labor Commissioner may need to look at and/or review the project on a broader basis or as a “whole” to determine compliance with Senate Bill 207. While the law does not necessarily provide any “carve outs” to not enforce the law contractor by contractor, subcontractor by subcontractor, or project by project, the Labor Commissioner will review compliance with Senate Bill 207 and compliance with prevailing wage laws based on the facts and evidence presented and the actions of the contractors, subcontractors, and public/awarding bodies.

WHAT HAPPENS IF THE PUBLIC/AWARDING BODY AND/OR LABOR COMMISSIONER FIND I COMMITTED A VIOLATION?

The law provides for notice, due process, and an opportunity to be heard. NAC sections 338.105 through 338.116 set forth the provisions governing the investigation, determination, objection, and hearing process. NRS section 338.015 also provides for notice and an opportunity for a hearing before an administrative penalty may be imposed. The Labor Commissioner does have the authority to impose administrative penalties of up to \$5,000 per violation against contractors, subcontractors, and public/awarding bodies.

Contractors, subcontractors, and public/awarding bodies should comply with the certified payroll reporting and review requirements set forth in NRS and NAC section 338 to monitor and review compliance with Senate Bill 207 and prevailing wage laws.

In the event a claim/complaint is filed with the Labor Commissioner it will follow the process set forth in NAC sections 338.106 through 338.116 and/or NRS section 338.015, and any other applicable laws and regulations.

Failure to maintain proper documentation and/or submit required reports, such as certified payroll reports, could result in potential violations and disqualification.

Intentional and/or purposeful actions that demonstrate an intent to circumvent the requirements of Senate Bill 207 and prevailing wage laws may result in administrative penalties and disqualification.

CONCLUSION

In this Advisory Opinion, the Labor Commissioner has attempted to provide guidance on the interpretation and implementation of Senate Bill 207. The Labor Commissioner will defer to the legislative intent, plain language, legislative testimony, and intent of Senate Bill 207 should additional questions arise.

The Labor Commissioner has made every effort to address the questions, concerns, and issues raised relating to Senate Bill 207. To the extent that a question, concern, or issue is not addressed in this Advisory Opinion, it is recommended that you contact the Office of the Labor Commissioner and submit your question(s) in writing to AUA@labor.nv.gov or contact our office at the phone numbers and address locations listed on the first page of this Advisory Opinion.

Please be advised that the Labor Commissioner may revisit the interpretation and implementation of Senate Bill 207 as needed through an additional Advisory Opinion or through the Administrative Rulemaking process.

Sample Forms and information on SB 207 can be found at:
http://labor.nv.gov/Apprenticeship_Utilization_Act/Apprenticeship_Utilization_Act/

Sincerely,



Shannon M. Chambers
Labor Commissioner
Office of the Labor Commissioner
State of Nevada
Department of Business and Industry

STEVE SISOLAK
Governor

TERRY REYNOLDS
Director

SHANNON M. CHAMBERS
Labor Commissioner

STATE OF NEVADA



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Department of Business & Industry

OFFICE OF THE LABOR COMMISSIONER

<http://www.labor.nv.gov>

Senate Bill 207 – Apprenticeship Utilization Act becomes effective January 1, 2020
<https://www.leg.state.nv.us/App/NELIS/REL/80th2019/Bill/6351/Text>

APPRENTICE VERIFICATION PROCESS

When a Contractor and/or Subcontractor first lists an Apprentice on a Certified Payroll Report (CPR) they must submit with that CPR documentation to substantiate that the Apprentice is registered with the Bureau of Apprenticeship and Training of the Office of Apprenticeship, Training, Employer and Labor Services of the Employment and Training Administration of the United States Department of Labor or its successor **and** the State Apprenticeship Council. (Emphasis added). A properly enrolled and registered Apprentice is exempt from NRS 338.020 to NRS 338.090, inclusive. An Apprentice is paid pursuant to terms of the Apprenticeship Agreement/Standards for the type of work covered by the Apprenticeship Agreement/Standards as approved by the State Apprenticeship Council and/or Nevada Revised Statutes (NRS) section 610 or Nevada Administrative Code (NAC) section 610. (See NRS 338.080)

ELECTRONIC REPORTING/VERIFICATION OF APPRENTICES FOR CERTIFIED PAYROLL REPORTS AND SENATE BILL 207

Contractor and/or Subcontractors utilizing electronic Certified Payroll Reporting software, such as LCP Tracker or other software, should upload the documentation substantiating that the Apprentice is registered with the Bureau of Apprenticeship and Training of the Office of Apprenticeship, Training, Employer and Labor Services of the Employment and Training Administration of the United States Department of Labor or its successor **and** the State Apprenticeship Council. The Contractor and/or Subcontractor should upload any Apprentice Forms verifying the Apprentice's registration and any expiration parameters that need to be applied for the Apprentice in the Certified Payroll Reporting software.

The Awarding/Public Bodies should verify and review /certify that the Apprentice is registered and that the supporting documents were electronically uploaded before a Contractor and/or Subcontractor can certify them on the first Certified Payroll Report. The Awarding/Public Bodies and/or other entities as necessary, will validate the Apprentice information as the database Administrator for that project or multiple projects. This will allow the database Administrator, typically, the Awarding/Public Bodies, to verify and accept the Apprentice Forms for the Apprentice/Worker in question, regardless of the number of projects the Apprentice/Employee may be assigned to within the database.

****Contractors and/or Subcontractors and/or Awarding/Public Bodies will not need to obtain an Apprentice Verification Form because, the Apprentice Forms will be loaded into the database by the Contractor and/or Subcontractor along with any expiration parameters. This information will then be reviewed and verified by the Awarding/Public Bodies and/or other entities as necessary.**

This Apprentice approval process ensures an Apprentice is: 1.) Registered with the Bureau of Apprenticeship and Training of the Office of Apprenticeship, Training, Employer and Labor Services of the Employment and Training Administration of the United States Department of Labor or its successor **and** the State Apprenticeship Council; and 2.) Assists with validating Apprentice %'s for purposes of Senate Bill 207.

Compliance with Senate Bill 207 (Passed during 2019 Legislative Session.) The Awarding/Public Bodies and Contractors or Subcontractors must ensure the reporting of Apprentices complies with Senate Bill 207, unless a Waiver has been granted by the Labor Commissioner. Apprentices shall be used and reported for at least 10 % of the total hours on vertical construction and 3 % of the total hours for horizontal construction of the total hours of labor worked for each apprenticed craft or type of work to be performed on the public work when more than three employees of each a craft are employed at the site of work.

Apprenticeship Ratio: Be sure to review the apprenticeship standards to see if they provide for a ratio of apprentices to journeymen. If the ratio is not complied with the apprentice is to be paid at full journeyman rate for the type of work performed. (See NAC 338.0095). Awarding/Public Bodies may contact the Governor's Office of Workforce Innovation to verify the proper apprenticeship ratio because, they have jurisdiction over the Nevada State Apprenticeship Council and apprenticeship standards/agreements and the registration of apprentices.

STEVE SISOLAK
Governor

TERRY REYNOLDS
Director

SHANNON M. CHAMBERS
Labor Commissioner

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Department of Business & Industry

OFFICE OF THE LABOR COMMISSIONER

<http://www.labor.nv.gov>

**SUPPLEMENTAL GUIDANCE
APPRENTICESHIP UTILIZATION ACT
MARCH 5, 2021**

**WHAT DOES MORE THAN 3 WORKERS EMPLOYED FOR EACH
APPRENTICED CRAFT OR TYPE OF WORK PERFORMED MEAN?**

For a public works project over \$100,000, the Apprenticeship Utilization Act – Nevada Revised Statutes (NRS) section 338.01165, would be triggered when there were more than 3 workers employed for each apprenticed craft or type of work to be performed on the public works project. NRS section 338.01165 does not specify or clarify if the more than 3 is for the entire public works project, or more than 3 for a specific day(s), week(s), and/or another period. NRS section 338.01165 does however clarify that for Horizontal Construction, if there are more than 3 workers employed for each apprenticed craft or type of work performed, then 3% of the total hours for that apprenticed craft or type of work performed must be worked by an apprentice. For Vertical Construction, it is 10% of the total hours for that apprenticed craft or type of work performed that must be worked by an apprentice.

The Office of the Labor Commissioner/Labor Commissioner (OLC/LC) has interpreted the plain language of NRS section 338.01165 in connection with the legislative history and intent to mean that there must be more than 3 employees/workers employed on the public works project/work site at any one time and/or the same time for each apprenticed craft or type of work performed to trigger the requirements of NRS section 338.01165. In other words, there must be a “crew” of more than 3 employees/workers for each apprenticed craft or type of work performed on the public works project/work site at the same time for the requirements of NRS section 338.01165 to apply. This could include a crew of more than 3 employee/workers of an apprenticed craft or type of work performed present at the same time on the project/work site for only 1 full day of work. The OLC/LC would also look to the potential rotation of crews to avoid the requirements of NRS section 338.01165.

CITY OF SPARKS

Project Workforce Checklist

For Compliance with the Nevada Apprenticeship Utilization Act, 2019

Project: _____ Contractor: _____

Craft/Type of Work	More than 3 Employees Anticipated?	Anticipate Needing Waiver?†
Air Balance Technician	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Alarm Installer	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Boilermaker	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Bricklayer , can also include tile setter, terrazzo workers and marble masons.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Carpenter , can also include cement masons, floor coverer, millwright and piledriver (non-equipment), plasterers and terrazzo workers.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Cement Mason	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Electrician , includes communication technician, line, neon sign and wireman. Can also include alarm installer.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Elevator Constructor	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Fence Erector	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Flag Person	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Floor Coverer	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Glazier (see also Painters and Allied Trades)	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Highway Striper	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Hod Carrier , includes brick-mason tender and plaster tender.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Iron Worker , can also include fence erectors (steel/iron)	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Laborer , can also include fence erector (non-steel/iron), flag person, highway striping and traffic barrier erector	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Lubrication and Service Engineer	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Mason , can also cement, plasterer, tile setter, terrazzo workers and marble masons	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Mechanical Insulator	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Millwright	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Operating Engineer , can also include equipment greaser, piledriver, soils and material tester, steel fabricator/erector (equipment) and surveyor (non-licensed) and well driller.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Painters and Allied Trades , can also include glaziers, floor coverers, and tapers.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Pile Driver (non-equipment)	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>

Craft/Type of Work	More than 3 Employees Anticipated?	Anticipate Needing Waiver? [‡]
Plasterer	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Plumber/Pipefitter	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Refrigeration	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Roofer (not sheet metal)	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Sheet Metal Worker, can also include air balance technician.	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Soils and Materials Tester, includes certified soil tester	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Sprinkler Fitter	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Surveyor (non-licensed)	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Taper	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Tile/Terrazzo Worker/Marble Mason	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Traffic Barrier Erector	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Truck Driver	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Well Driller (see also Operating Engineer)	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Other*:	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
[‡] Pursuant to the Labor Commissioner’s Nov. 27, 2019 Advisory Opinion, waivers are not required in those crafts/types of work where no recognized apprenticeship program exists in the region where the public work is located. Contractor is responsible for verifying whether recognized apprenticeship programs exist in the region for each craft/type of work to be performed.		
*Contractor is responsible for ensuring all crafts/types of work to be performed on the public work are accounted for in this checklist. Attach additional pages if needed.		

I affirm I am fully authorized to acknowledge, on behalf of the Contractor listed above, the anticipated workforce, and acknowledge that changes to the anticipated workforce which may have an impact on compliance with the Nevada Apprenticeship Utilization Act, 2019 will require the submittal of a revised form within ten (10) working days of such change.

Signed: _____

Name and Title: _____

Date: _____

Contractor Name: _____

STATE OF NEVADA
Office of the Labor Commissioner

REQUEST FOR APPRENTICE AVAILABILITY ON A PUBLIC WORK

Senate Bill (SB) 207 - Apprenticeship Utilization Act passed during the 2019 Legislative Session adds a section to NRS section 338. In passing SB 207, The Legislature hereby finds and declares that: (1) A skilled workforce in construction is essential to the economic well-being of the State; (2) Apprenticeship programs are a proven method of training a skilled workforce in construction; and (3) Requiring the use of apprentices on the construction of public works will ensure the availability of a skilled workforce in construction in the future for this State. <https://www.leg.state.nv.us/App/NELIS/REL/80th2019/Bill/6351/Text>

You may use this form to request an Apprentice or determine availability of an Apprentice from a Registered Apprenticeship Program in the applicable craft or trade in the area of the Public Works Project. For information about Registered Apprenticeship Programs in your area and Registered Apprentices, please visit www.labor.nv.gov or the Nevada State Apprenticeship Council at www.owinn.nv.gov/Apprenticeship/AboutSAC/ *The Governor's Office of Workforce Innovation (OWINN) is responsible for the Nevada State Apprenticeship Council and the approval and registration of Apprenticeship Programs and Apprentices.

Requests for dispatch must be in writing and submitted (and received) at least 5 business days in advance (excluding weekends and holidays) via first class mail, fax or email. Proof of submission (and receipt) will be required. Please refer to Chapter 610 of the Nevada Revised Statutes and Nevada Administrative Code Chapter 610 for the laws and regulations governing Registered Apprenticeship Programs and Registered Apprentices.

Request Submitted to: _____ Date Request Submitted: _____

Name of Registered Apprenticeship Program: _____
Contact Person/Title: _____
Address: _____, _____, NV _____
Tel No.: (____) _____ Fax No.: (____) _____ Email: _____

Requestor Information:
Contractor/Subcontractor: _____ License Number: _____
Contact Person/Title: _____
Address: _____, _____, _____
Tel No.: (____) _____ Fax No.: (____) _____ Email: _____

Availability Request Information:
Number of Apprentice(s) Required: ____ Craft or Trade: _____
Apprentice(s) Report Date: _____ (5 business days' notice required) Report Time: __: __ __.
Name of Person to Report to: _____
Address to Report to: _____, _____, NV _____

Project Information:
Contract Name/Number: _____ Project Location: _____
Awarding Body Name: _____
Contact Person/Title: _____
Tel No.: (____) _____ Fax No.: (____) _____ Email: _____

 Print Name/Title _____ *Signature ____/____/____ Date

*By signing this form you certify that the information you have provided is true and correct to the best of your knowledge.

Request Approved: Request Denied:

Notes: _____

 Print Name/Title _____ Signature ____/____/____ Date
 Date Received: _____ Date Returned: _____

**Governor's Office of Workforce
Innovation (OWINN)**

Main Phone # 702-486-8080

When completed, email to:
NVApprenticeship@gov.nv.gov



**REQUEST FOR NEVADA
REGISTERED APPRENTICE
VERIFICATION**

Name of requesting contractor/awarding body/organization:	
Name and title of person requesting this verification:	
Contact phone # of person requesting this verification:	
Email address of person requesting this verification:	
Date this request was submitted to OWINN:	
Additional information regarding current Public Works projects for requester: (for example, project owner(s), PWP/contract #(s), project name(s), etc.)	

*APPRENTICE NAME (First, Last)	RAPIDS ID #	OCCUPATION	APPRENTICESHIP PROGRAM (for example, Local 12)
Additional information regarding apprentice(s): (for example, apprentice status, wage %, etc.)			

*Apprentices only need to be verified once per year/per contractor, and once approved, can be used for multiple Public Works.

Note: The Requesting Contractor/Awarding Body/Organization certifies and assures the information above is true and correct. It also acknowledges that Journeymen wages must be paid for time worked during canceled or suspended time periods or when required ratios are not met. Furthermore, the OWINN office will not process this Apprentice Verification request unless this form is signed, and ALL FIELDS are completed.

Signed: _____ **Date:** _____

Name/Title: _____

FOR OWINN USE ONLY

Date Received: _____

Occupation	Initial Ratio		Ratio Thereafter	
	Apprentice(s)	per Journeymen	Apprentice(s)	per Journeymen
	_____ / _____		_____ / _____	
	_____ / _____		_____ / _____	

OWINN Verified by: _____ Date: _____

STATE OF NEVADA
Office of the Labor Commissioner

APPRENTICESHIP UTILIZATION ACT WAIVER REQUEST

Senate Bill (SB) 207 - Apprenticeship Utilization Act passed during the 2019 Legislative Session adds a section to NRS section 338. In passing SB 207, The Legislature hereby finds and declares that: (1) A skilled workforce in construction is essential to the economic well-being of the State; (2) Apprenticeship programs are a proven method of training a skilled workforce in construction; and (3) Requiring the use of apprentices on the construction of public works will ensure the availability of a skilled workforce in construction in the future for this State. <https://www.leg.state.nv.us/App/NELIS/REL/80th2019/Bill/6351/Text>

A Public Body, upon the request of a contractor or subcontractor, may submit a request for a modification or waiver of the percentage of hours of labor of one or more apprentices prior to (1) the bid advertisement; (2) the bid opening; or (3) the award of the contract if, "Good Cause" exists. The Labor Commissioner may also grant a waiver from the requirements of SB 207 after work on the public work has commenced if the public body, contractor or subcontractor submits documentation and evidence that meets the requirements to establish "Good Cause."

Public Works Project (PWP) # _____
Awarding Body Name: _____
Contact Person/Title: _____
Address: _____, NV _____
Phone: (____) _____ **Fax:** (____) _____ **E-Mail:** _____

Contractor/Subcontractor: _____ **License Number:** _____
Contact Person/Title: _____
Address: _____, _____
Phone: (____) _____ **Fax:** (____) _____ **E-Mail:** _____

Please check the box for the reason for a Waiver Request and provide/submit supporting documentation/evidence:

Yes No
 There are no Apprentices available from an Apprenticeship Program Registered by the Nevada State Apprenticeship Council within the jurisdiction where the public work is to be completed.

Yes No
 The contractor or subcontractor is required to perform uniquely complex or hazardous tasks on the public work that require the skill and expertise of a greater percentage Apprentice or Journeyworkers.

Yes No
 The contractor or subcontractor has requested Apprentices from a Registered Apprenticeship Program and the request has been denied or the request has not been approved within 5 business days.

Please attach additional documentation/evidence supporting the Waiver Request or describe why an Apprentice is not available or cannot be provided:

Contractor/Subcontractor Name Date Waiver Request Submitted to Awarding Body *Signature

Awarding Body Printed Name/Title *Signature Date

***By signing this form, you certify that the information you have provided is true and correct to the best of your knowledge.**

For Office of the Labor Commissioner's Use Only:

Waiver Request Approved: Waiver Request Denied:

Notes: _____

Printed Name/Title Signature Date

Date Received: _____ **Date Returned:** _____

Forms

(to be used following award of bid)

- 1) Contract Form**
- 2) Performance Bond**
- 3) Payment Bond**



TITLE
BID # BIDNUMBER
PWP# PWPNUMBER

THIS CONTRACT made and entered into on this DAY day of MONTH, YEAR by and between the Redevelopment Agency of the City of Sparks, Nevada, a municipal corporation, existing under and by virtue of the laws of the State of Nevada, hereinafter called "Agency", and **CONTRACTORNAME**, a qualified Contractor in the class of work required, hereinafter called "Contractor".

W I T N E S E T H

WHEREAS, the City has awarded a contract to Contractor for providing material and/or performing the work hereinafter mentioned in accordance with the proposal of said Contractor;

WHEREAS, the Contractor will provide the material and/or perform the work for the compensation stated in said proposal, an amount which has been arrived at between the parties;

WHEREAS, each party is willing to and does assume joint liability for the contents of this Contract, and each party accordingly agrees that it shall not be construed against any party as a drafting party;

NOW, THEREFORE, IT IS AGREED as follows:

1. Scope of Work:

The scope of work for this contract is generally defined as **TITLE**. The Agency's Contract Documents and Contractor's Entire Proposal are on file with the Redevelopment Agency of the City of Sparks. All terms, conditions and requirements contained within these Documents, including any and all bid documents, addenda and specifications issued by the Agency, are hereby incorporated by reference into this Contract.

The Contractor shall perform within the time stipulated, the Contract as herein defined and shall provide and furnish any and all of the labor, materials, methods or processes, equipment implements, tools, machinery and equipment, and all utility, transportation and other services required to construct, install and put in complete order for use in a good and workmanlike manner all of the work covered by the Contract in connection with strict accordance with the plans and specifications therein, which were approved by said Agency and are on file with the Agency, including any and all addenda issued by the Agency, and with the other contract documents hereinafter enumerated.

2. Payment for Project Services

As full consideration for the Services to be performed by Contractor, Agency agrees to pay Contractor as set forth in accordance with the bid and not to exceed fee of **\$AMOUNT** for the project.

A monthly progress payment in the amount of ninety-five percent (95%) of the value of the work completed may be made every thirty (30) days upon application by the Contractor and certification by the Project Manager that such work has been completed.



Partial payments will be made once each month as the work satisfactorily progresses and after acceptance by the authorized Agency representative. The progress estimates shall be based upon materials in place, or on the job site and invoiced, and labor expended thereon. From the total of the amount ascertained will be deducted an amount equivalent to five percent (5%) of the whole, which five percent (5%) will be retained by the Agency until after completion of the entire Contract in an acceptable manner. Any time after fifty percent (50%) of the value of the work has been completed, the Agency will make any of the remaining partial payments in full.

No such estimates or payments shall be required to be made, when, in the judgment of the Agency Project Manager, the work is not proceeding in accordance with the provision of the Contract, or when in his judgment the total value of the work done since last estimate amounts to less than Five Hundred Dollars (\$500.00).

The cost of materials conforming to the plans and specifications (materials being those which are required to be contained and incorporated in a finished contract bid item) delivered to the project and not at the time incorporated in the work, may also be included in the estimate for payment. No such estimate or payment shall be construed to be an acceptance of any defective work or improper material. The Contractor shall be responsible for, and shall not remove from the project any material that has been included in the estimate for payment.

Final payment shall be made upon the Project Manager certifying that the Contractor has satisfactorily completed the work in conformity with the Contract Documents.

3. Time for Completion:

The Contractor shall deliver the material and/or services called for in the specifications/proposal and within the delivery time specified and in accordance with the terms of the contract. Work shall be completed within _____ days from the Notice to Proceed issued by the City of Sparks Purchasing Division. The Contractor shall not alter or vary any terms or conditions contained or incorporated herein, including but not limited to, the quantity, price, delivery date or date designated as After Receipt of Order (ARO) or date for commencement or completion of services as mutually agreed upon, unless such alteration or variation is consented to in writing by a duly authorized representative of the Agency.

The Agency reserves the right to cancel resultant Contract upon ten days written notice in the event the type and quality of the product or work performance is unsatisfactory or in default, subject to Contractor's right to cure as outlined in termination clause.

This is a non-exclusive Contract and the Agency reserves the right to acquire the material and/or services at its discretion, from other sources during the term of this Contract.

4. No Unlawful Discrimination:

In connection with the performance of work under this contract, the contractor agrees not to discriminate against any employee or applicant for employment because of race, creed, color, national origin, sex, sexual orientation, gender identity or expression, or age, including, without limitation, with regard to 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, without



limitation, apprenticeship. The contractor further agrees to insert this provision in all subcontracts hereunder, except subcontracts for standard commercial supplies or raw materials.

Any violation of these provisions by Contractor shall constitute a material breach of contract. In all cases where persons are employed in the construction of public works, preference must be given when the qualifications of the applicants are equal:

- A) First: To honorably discharged soldiers, sailors and marines of the United States who are citizens of the State of Nevada.
- B) Second: To other citizens of the State of Nevada

If the provisions of this section are not complied with by the contractor engaged on the public work, the contract is void, and any failure or refusal to comply with any of the provisions of this section renders any such contract void and subject to the exceptions contained in this section, no money may be paid out of the State Treasury or out of the treasury of any political subdivision of the State to any person employed on any work mentioned in this section unless there has been compliance with the provisions of this section. Any contractor engaged on a public work or any other person who violates any of the provisions of this section is guilty of a misdemeanor. The penalties provided for in this section do not apply where violations thereof are due to misrepresentations made by the employee or employees.

5. No Illegal Harassment:

Violation of the City's harassment policy, which is incorporated by reference and available from the Human Resource Division, by the Contractor, its officers, employees, agents, vendors, consultants, subcontractors and anyone from whom it is legally liable, while performing or failing to perform Contractor's duties under this Contract shall be considered a material breach of contract.

6. Lawful Performance:

Vendor shall abide by all Federal, State and Local Laws, Ordinances, Regulations, and Statutes as may be related to the performance of duties under this agreement. In addition, all applicable permits and licenses required shall be obtained by the vendor, at vendor's sole expense.

7. Preferences (This Section IS IS NOT Applicable to this contract):

To the extent Contractor has sought and qualified for a bidding preference and this project has a value of over \$250,000 pursuant to Nevada Revised Statutes Chapter 338, Contractor acknowledges and agrees that the following requirements will be adhered to, documented and attained for the duration of the Project:

- 1. At least 50 percent of the workers employed on the Project (including subcontractors) hold a valid driver's license or identification card issued by the Nevada Department of Motor Vehicles;
- 2. All vehicles used primarily for the public work will be (a) registered and (where applicable) partially apportioned to Nevada; or (b) registered in Nevada; and
- 3. The Contractor shall maintain and make available for inspection within Nevada all payroll records related to the Project.

Contractor recognizes and accepts that failure to comply with any requirements herein shall be a



material breach of the contract and entitle the Agency to liquidated damages in the amount set by statute. In addition, the Contractor recognizes and accepts that failure to comply with any requirements herein may lose its certification for a preference in bidding and/or its ability to bid on any contracts for public works pursuant to NRS Chapter 338.

To the extent Contractor has sought and qualified for a bidding preference and this project has a value of over \$250,000 pursuant to Nevada Revised Statutes Chapter 338, each contract between the contractor, applicant or design-build team and a subcontractor must provide for the apportionment of liquidated damages assessed pursuant to this section if a person other than the Contractor was responsible for the breach of a contract for a public work caused by a failure to comply with a requirement of Items 1-5 within this section. The apportionment of liquidated damages must be in proportion to the responsibility of each party for the breach.

8. Prevailing Wages:

The Contractor and subcontractors shall be bound by and comply with all federal, state and local laws with regard to minimum wages, overtime work, hiring and discrimination, including Chapter 338 of the NRS, which is entitled, "Public Works Projects."

The Contractor shall ensure that all employees on the work site are paid in accordance with the CURRENT PREVAILING WAGE RATES AS APPROVED BY THE STATE LABOR COMMISSIONER, whenever the actual value of the Contract totals One Hundred Thousand Dollars (\$100,000) or more, or when required by the Supplementary Conditions. If a Change Order causes a Contract to exceed One Hundred Thousand Dollars (\$100,000), the State Labor Commissioner may audit the entire Contract period.

Questions involving the Prevailing Wage Rates should be referred to the Labor Commissioner, State of Nevada, at (775) 687-4850.

When federal money is associated with the project making the Contract subject to both state and federal wage rates, the Contractor shall not pay less than the higher rate when the two rates differ for similar kinds of labor.

- A. Posting of Minimum Wage Rates - In accordance with NRS, Chapter 338, Section 338.020, the Contractor shall post the hourly and daily rate of wages to be paid to each of the classes of mechanics and workers on the site of Work of this Contract in a place generally visible to the workers.
- B. Pursuant to NRS 338.060 and 338.070, the Contractor hereby agrees to forfeit, as a penalty to the Agency, not less than Twenty Dollars (\$20) nor more than Fifty Dollars (\$50) for each calendar day or portion thereof that each worker employed on the Contract is paid less than the designated rate for any work done under the Contract, by the Contractor or any subcontractor under him, or is not reported to the Agency as required by NRS 338.070.
- C. The contractor and each subcontractor shall keep or cause to be kept an accurate record showing, for each worker employed by the contractor or subcontractor:
 - (1) The name of the worker;



-
- (2) The occupation of the worker;
 - (3) If the worker has a driver's license or identification card, an indication of the state or other jurisdiction that issued the license or card; and
 - (4) The actual per diem, wages and benefits paid to the worker.

In addition, the contractor and each subcontractor shall keep or cause to be kept an accurate record showing, for each worker employed by the contractor or subcontractor who has a driver's license or identification card:

- (1) The name of the worker;
- (2) The driver's license number or identification card number of the worker; and
- (3) The state or other jurisdiction that issued the license or card.

D. The records in Section C above must be open at all reasonable hours to the inspection of the City of Sparks, and its officers and agents. A copy of the each record for each calendar Month for the General Contractor and all Sub-Contractors must be submitted to the Agency no later than 15 days after the end of each month for the previous months' wages.

9. Apprenticeship Utilization Act:

Senate Bill 207 (Apprenticeship Utilization Act) passed during the 2019 Legislative Session added sections 338.0116 and 338.01165 to the NRS. These new provisions apply to bids for public works where the value exceeds \$100,000.00. In passing SB 207, The Legislature hereby finds and declares that: (1) A skilled workforce in construction is essential to the economic well-being of the State; (2) Apprenticeship programs are a proven method of training a skilled workforce in construction; and (3) Requiring the use of apprentices on the construction of public works will ensure the availability of a skilled workforce in construction in the future for this State.

A contractor or subcontractor engaged in **horizontal construction** who employs a worker on a public work pursuant to NRS 338.040 shall use one or more apprentices for at least 3 percent of the total hours of labor worked for each apprenticed craft or type of work to be performed on the public work for which more than three workers are employed.

“Horizontal Construction” means any construction, alteration, repair, renovation, demolition or remodeling necessary to complete a public work, including, without limitation, any irrigation, drainage, water supply, flood control, harbor, railroad, highway, tunnel, airport or airway, sewer, sewage disposal plant or water treatment facility and any ancillary vertical components thereof, bridge, inland waterway, pipeline for the transmission of petroleum or any other liquid or gaseous substance, pier, and any other work incidental thereto. The term does not include vertical construction, the construction of any terminal or other building of an airport or airway, or the construction of any other building.

A contractor or subcontractor engaged in **vertical construction** who employs a worker on a public work pursuant to NRS 338.040 shall use one or more apprentices for at least 10 percent of the total hours of labor worked for each apprenticed craft or type of work to be performed on the public work for which more than three workers are employed.



“Vertical Construction” means any construction, alteration, repair, renovation, demolition or remodeling necessary to complete a public work for any building, structure or other improvement that is predominantly vertical, including, without limitation, a building, structure or improvement for the support, shelter and enclosure of persons, animals, chattels or movable property of any kind, and any other work or improvement appurtenant thereto.

A Public Body/Awarding Body, upon the request of a contractor or subcontractor, **MAY** submit a request for a modification or waiver of the percentage of hours of labor of one or more apprentices prior to (1) the bid advertisement; (2) the bid opening; or (3) the award of the contract if, “Good Cause” exists. The Labor Commissioner may also grant a modification or waiver from the requirements of NRS 338.01165 after work on the public work has commenced.

10. Acceptance by the Agency:

It is expressly understood and agreed that all materials provided and/or work done by the Contractor shall be subject to inspection and acceptance by the Agency at its discretion, and that any progress inspections and approval by the Agency of any item or work shall not forfeit the right of the Agency to require the correction of faulty workmanship or material at any time during the course of the work, although previously approved by oversight. Nothing herein contained shall relieve the Contractor of the responsibility for proper construction and maintenance of the work, materials and equipment required under the terms of this Contract until all work has been completed and accepted by the Agency.

11. Waiver:

No waiver of any term, provision or condition of this Contract, whether by conduct or otherwise, in any one or more instances, shall be deemed to be nor shall it be construed as a further or continuing waiver of any such term, provision or condition of this Contract. No waiver shall be effective unless it is in writing and signed by the party making it.

12. Notices:

All notices required to be given in writing by this Contract shall be deemed to be received (i) upon delivery if personally delivered, or (ii) when receipt is signed for if mailed by certified or registered mail, postage prepaid, or by express delivery service or courier, when addressed as follows (or sent to such other address as a Party may specify in a notice to the others):

PURCHASING MANAGER
CITY OF SPARKS
431 PRATER WAY
PO BOX 857
SPARKS, NV 89432-0857

CONTRACTOR:
CONTACT
CONTRACTORNAME
ADDRESS
CITY, STATE ZIP
e-mail:

13. Arbitration:

Any and all disputes, controversies or claims arising under or in connection with this Contract, including without limitation, fraud in the inducement of this Contract, or the general validity or enforceability of this Contract, shall be governed by the laws of the State of Nevada without giving effect to conflicts of law principles, may be submitted to binding arbitration before one arbitrator, and shall be conducted in



accordance with the Commercial Arbitration Rules of the American Arbitration Association in a private manner in Washoe County, Nevada. This award shall be final and judgment may be entered upon it in any court having jurisdiction thereof. In reaching this final award, the arbitrator shall have no authority to change or modify any provision of this Contract. All other expenses of arbitration shall be borne equally by the parties. All fees, including legal fees, shall be borne by the party who incurred them. All costs of enforcement shall be borne by the losing party. Each party shall have the right to discovery in accordance with the Nevada Rules of Civil Procedure.

14. Jurisdiction and Venue:

In the event the arbitration award is challenged, any action or proceeding seeking to do so must be brought in the courts of the State of Nevada, County of Washoe, or if the party can acquire subject-matter jurisdiction, in the United States District Court for the District of Nevada in the City of Reno. Each of the parties consents to the personal jurisdiction of such courts (and of the appropriate appellate courts) in any such action or proceeding and waives any objection to venue laid therein. Process in any action or proceeding referred to in the preceding sentence may be served on either party by sending it certified mail to the respective addresses designated for notice.

15. Indemnification:

To the fullest extent permitted by law, upon award, Contractor shall hold harmless, indemnify, defend and protect Agency, its affiliates, officers, agents, employees, volunteers, successors and assigns (“Indemnified Parties”), and each of them from and against any and all claims, demands, causes of action, damages, costs, expenses, actual attorney’s fees, losses or liabilities, in law or in equity, of every kind and nature whatsoever (“Claims”) arising out of or related to any act or omission of Contractor, its employees, agents, representatives, or Subcontractors in any way related to the performance of work under this Agreement by Contractor, or to work performed by others under the direction or supervision of Contractor, including but not limited to:

1. Personal injury, including but not limited to bodily injury, emotional injury, sickness or disease, or death to persons;
2. Damage to property of anyone, including loss of use thereof;
3. Penalties from violation of any law or regulation caused by Contractor’s action or inaction;
4. Failure of Contractor to comply with the Insurance requirements established under this Agreement;
5. Any violation by Contractor of any law or regulation in any way related to the occupational safety and health of employees.

In determining the nature of the claim against Agency, the incident underlying the claim shall determine the nature of the claim, notwithstanding the form of the allegations against Agency.

If Agency’s personnel are involved in defending such actions, Contractor shall reimburse Agency for the time and costs spent by such personnel at the rate charged Agency for such services by private professionals.

In cases of professional service agreements, requiring professional liability coverage:

If the insurer by which a Consultant is insured against professional liability does not so defend the



Agency and applicable agents and/or staff, and the Consultant is adjudicated to be liable by a trier of fact, the Agency shall be entitled to reasonable attorney's fees and costs to be paid to the Agency by the Consultant in an amount which is proportionate to the liability of the of the Consultant.

Nothing in this contract shall be interpreted to waive nor does the Agency, by entering into this contract, waive any of the provisions found in Chapter 41 of the Nevada Revised Statutes.

16. Licenses and Permits:

The Contractor shall procure at his own expense all necessary licenses and permits and shall adhere to all the laws, regulations and ordinances applicable to the performance of this Contract.

All Contractors, Sub-Contractors and Suppliers doing business within the City of Sparks are required to obtain a current business license from the City of Sparks prior to commencement of this contract. Per Sparks Municipal Code Section 5.08.020A: "It is unlawful for any person to transact business in the City without first having obtained a license from the City to do so and without complying with all applicable provisions of this title and paying the fee therefore."

17. Insurance:

BIDDERS' ATTENTION IS DIRECTED TO THE INSURANCE REQUIREMENTS BELOW. IT IS HIGHLY RECOMMENDED THAT BIDDERS CONFER WITH THEIR RESPECTIVE INSURANCE CARRIERS OR BROKERS TO DETERMINE IN ADVANCE OF BID SUBMISSION THE AVAILABILITY OF INSURANCE CERTIFICATES AND ENDORSEMENTS AS PRESCRIBED AND PROVIDED HEREIN. IF THE APPARENT LOW BIDDER FAILS TO COMPLY STRICTLY WITH THE INSURANCE REQUIREMENTS, THAT BIDDER MAY BE DISQUALIFIED FROM AWARD OF THE CONTRACT.

The Agency may, unless otherwise required by law, waive or reduce the insurance requirements itemized here, at the discretion of the Agency's Contracts and Risk Manager.

Should work be required on Agency premises or within the public right-of-way, upon award of the contract, the bidder shall provide proof of insurance for the types of coverage, limits of insurance and other terms specified herein, prior to initiation of any services under Agency, Bid, Proposal or Contract. Coverage shall be from a company authorized to transact business in the State of Nevada and the City of Sparks and shall meet the following minimum specifications:

Contractor shall at its own expense carry and maintain at all times the following insurance coverage and limits of insurance no less than the following or the amount customarily carried by Contractor or any of its subcontractors, whichever is greater. Contractor shall also cause each subcontractor employed by Contractor to purchase and maintain insurance of the type specified herein. All insurers must have AM Best rating not less than A-VII, and be acceptable to the Agency. Contractor shall furnish copies of certificates of insurance evidencing coverage for itself and for each subcontractor. Failure to maintain the required insurance may result in termination of this contract at Agency's option. If Contractor fails to maintain the insurance as set forth herein, Agency shall have the right, but not the obligation, to purchase said insurance at Contractor's expense.



Contractor shall provide proof of insurance for the lines of coverage, limits of insurance and other terms specified below prior to initiation of any services. Coverage shall be from a company authorized to transact business in the State of Nevada and the City of Sparks. Contractor and any of its subcontractors shall carry and maintain coverage and limits no less than the following or the amount customarily carried by Contractor or any of its subcontractors, whichever is greater.

Applicable to this Contract	Insurance Type	Minimum Limit	Insurance Certificate	Additional Insured	Waiver of Subrogation
Yes	General Liability/Umbrella (Excess) Liability	\$2,000,000	✓	✓	✓
Yes	Automobile Liability	\$1,000,000	✓	✓	
Yes	Workers' Compensation	Statutory	✓	N/A	✓
Yes	Employer's Liability	\$1,000,000	✓	N/A	
No	Professional Liability	\$1,000,000	✓	N/A	N/A
No	Pollution Legal Liability	\$1,000,000	✓	N/A	N/A

Commercial General Liability

Contractor shall carry and maintain Commercial General Liability (CGL) and, if necessary to meet required limits of insurance, commercial umbrella/excess liability insurance with a total limit of not less than the limits specified herein.

For contracts that are for the construction or improvement of public facilities, the Contractor shall obtain and maintain products and completed operations liability coverage through the statute of repose after completion of the project. Continuing commercial umbrella coverage, if any, shall include liability coverage for damage to the insured's completed work equivalent to that provided under ISO form CG 00 01.

There shall be no endorsement or modification of the CGL limiting the scope of coverage for liability arising from pollution, explosion, collapse, underground property damage, or damage to the named insured's work unless Subcontractor carries and maintains separate policies providing such coverage and provides Contractor evidence of insurance confirming the coverage.

Minimum Limits of Insurance

- \$2,000,000** Each Occurrence Limit for bodily injury and property damage
- \$2,000,000** General Aggregate Limit
- \$2,000,000** Products and Completed Operations Aggregate Limit
- \$10,000** Medical Expense Limit

If Commercial General Liability Insurance or other form with a general aggregate limit is used, it shall be revised to apply separately to this PROJECT or LOCATION.



Coverage Form

Coverage shall be at least as broad as the unmodified Insurance Services Office (ISO) Commercial General Liability (CGL) "Occurrence" form CG 00 01 04/13 or substitute form providing equivalent coverage and shall cover liability arising from premises, operations, independent contractors, products-completed operations, personal and advertising injury, and liability assumed under an insured contract (including the tort liability of another assumed in a business contract).

Additional Insured

Agency, its officers, agents, employees, and volunteers are to be included as insureds using the applicable ISO additional insured endorsement(s) or substitute forms providing equivalent coverage, in respects to damages and defense arising from: activities performed by or on behalf of Contractor, including the insured's general supervision of Contractor; products and completed operations of Contractor; premises owned, occupied, or used by Contractor. The coverage shall contain no special limitations on the scope of protection afforded to Agency, its officers, employees, or volunteers. Additional insured status for Agency shall apply until the expiration of time within which a claimant can bring suit per applicable state law.

Primary and Non-Contributory

Contractor's insurance coverage shall apply as primary insurance with respect to any other insurance or self-insurance programs afforded to Agency, its officers, agents, employees, and volunteers. There shall be no endorsement or modification of the CGL to make it excess over other available insurance; alternatively, if the CGL states that it is excess or pro rata, the policy shall be endorsed to be primary with respect to the additional insured. Any insurance or self-insurance maintained by Agency, its officers, employees, or volunteers shall be excess of Contractor's insurance and shall not contribute with it in any way.

Waiver of Subrogation

Contractor waives all rights against Agency and its agents, officers, directors and employees for recovery of damages to the extent these damages are covered by the commercial general liability or commercial umbrella liability insurance maintained pursuant to this agreement. Insurer shall endorse CGL policy as required to waive subrogation against the Agency with respect to any loss paid under the policy.

Endorsements

Policy forms or endorsements are required confirming coverage for all required additional insureds. The forms or endorsements for CGL shall be at least as broad as the unmodified ISO additional insured endorsement CGO 20 10 07/04 and CG 20 37 07/04 or substitute forms providing additional insured coverage for products and completed operations.

A waiver of subrogation in favor of Agency shall be endorsed to the policy using an unmodified Waiver of Transfer of Rights of Recovery of Others to Us ISO CG 24 04 05 09, or a substitute form providing equivalent coverage.

Electronic Data Liability

If any underground work will be performed, Contractor shall maintain electronic data liability insurance



applicable to the Project and insuring against liability arising out of the loss of, loss of use of, damage to, corruption of, inability to access, or inability to manipulate electronic data. This coverage shall be maintained with a limit of liability of not less than \$1,000,000 and provide coverage at least as broad as electronic data liability coverage form CG 04 37 (or substitute form providing equivalent coverage).

Railroad Protective Liability

For any construction or demolition work within fifty (50) feet of a railroad, Contractor shall maintain Railroad Protective Liability insurance on behalf of and in the name of the railroad, as named insured, with a limit of \$6,000,000 per occurrence or higher limit if required by the railroad. Contractor shall also ensure that any exclusions pertaining to the indemnification of a railroad are removed from its CGL policy or that ISO form CG 24 17 (Contractual Liability-Railroads Endorsements) is included in the coverage.

Business Automobile Liability

Minimum Limits of Insurance

\$1,000,000 Combined Single Limit per accident for bodily injury and property damage or the limit customarily carried by Contractor, whichever is greater. No aggregate limit may apply. Coverage may be combined with Excess/Umbrella Liability coverage to meet the required limit.

Coverage Form

Coverage shall be at least as broad as the unmodified Insurance Services Office (ISO) Business Automobile Coverage form CA 00 01 10/13, CA 00 25 10/13, CA 00 20 10/13 or substitute form providing equivalent coverage. Such insurance shall cover liability arising out of any auto (including owned, hired, and non-owned autos).

Pollution liability coverage at least as broad as that provided under the ISO pollution liability—broadened coverage for covered autos endorsement (CA 99 48) shall be provided, and the Motor Carrier Act endorsement (MCS 90) shall be attached for all contracts involving transportation of “hazardous material” as this term is defined by applicable law, including, but not limited to, waste, asbestos, fungi, bacteria and mold.

Additional Insured

Agency, its officers, agents, employees, and volunteers are to be included as insureds with respect to damages and defense arising from the ownership, maintenance or use of automobiles owned, leased, hired, or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to Agency, its officers, employees, or volunteers. Additional insured status for Agency shall apply until the expiration of time within which a claimant can bring suit per applicable state law.

Endorsements

A policy endorsement is required listing all required additional insureds. The endorsement for Business Automobile Liability shall be at least as broad as the unmodified ISO CA 20 48 10/13 or a substitute form confirming Agency’s insured status for Liability Coverage under the Who Is An Insured Provision contained in Section II of the coverage form ISO CA 00 01 10/13.



Waiver of Subrogation.

Contractor waives all rights against Agency, its officers, agents, employees, and volunteers for recovery of damages to the extent these damages are covered by the commercial general liability or commercial umbrella liability insurance maintained pursuant to this agreement. Contractor's insurer shall endorse policy to waive subrogation against Agency with respect to any loss paid under the policy.

Workers' Compensation and Employer's Liability

Contractor shall carry and maintain workers' compensation and employer's liability insurance meeting the statutory requirements of the State of Nevada, including but not limited to NRS 616B.627 and NRS 617.210 or provide proof that compliance with the provisions of Nevada Revised Statutes Chapters 616A-D and all other related chapters is not required. It is understood and agreed that there shall be no coverage provided for Contractor or any Subcontractor of the Contractor by the Agency. Contractor agrees, as a precondition to the performance of any work under this Agreement and as a precondition to any obligation of the Agency to make any payment under this Agreement to provide Agency with a certificate issued by an insurer in accordance with NRS 616B.627 and with a certificate of an insurer showing coverage pursuant to NRS 617.210.

It is further understood and agreed by and between Agency and Contractor that Contractor shall procure, pay for and maintain the above-mentioned coverage at Contractor's sole cost and expense.

Should Contractor be self-funded for workers' compensation and employer's liability insurance, Contractor shall so notify Agency in writing prior to the signing of this Contract. Agency reserves the right to approve said retentions, and may request additional documentation, financial or otherwise, for review prior to the signing of this Contract.

Upon completion of the project, Contractor shall, if requested by Agency, provide a Final Certificate for itself and each Subcontractor showing that Contractor and each Subcontractor had maintained the required Workers Compensation and Employer's Liability by paying all premiums due throughout the entire course of the project.

Nevada law allows the following to reject workers' compensation coverage if they do not use employees or subcontractors in the performance of work under the contract:

- Sole proprietors (NRS 616B.627 and NRS 617.210)
- Unpaid officers of quasi-public, private or nonprofit corporations (NRS 616B.624 and NRS 617.207)
- Unpaid managers of limited liability companies (NRS 616B.624 and NRS 617.207)
- An officer or manager of a corporation or limited liability company who owns the corporation or company (NRS 616B.624 and NRS 617.207)

If a contractor has rejected workers' compensation coverage under applicable Nevada law, the contractor must indicate the basis for the rejection of coverage and complete, sign and have notarized an Affidavit of Rejection of Coverage. The Affidavit must be completed, signed and notarized prior to performance of any work.



Minimum Limits of Insurance

Workers' Compensation:	Statutory Limits
Employer's Liability:	\$1,000,000 Bodily Injury by Accident – Each Accident
	\$1,000,000 Bodily Injury by Disease – Each Employee
	\$1,000,000 Bodily Injury by Disease – Policy Limit

Coverage Form

Coverage shall be at least as broad as the unmodified National Council on Compensation Insurance (NCCI) Workers Compensation and Employer's Liability coverage form WC 00 00 07/11 or substitute form providing equivalent coverage.

OTHER INSURANCE COVERAGES (IF APPLICABLE)

Professional Liability Insurance (if Applicable) \$1,000,000 each claim limits of liability or whatever limit is customarily carried by the Contractor, whichever is greater, for design, design-build or any type of professional services. If coverage is required on a claims-made or claims-made and reported basis, any applicable retroactive or pending & prior litigation dates must precede the effective date of this contract. Continuous coverage shall be maintained, or an extended reporting period shall be obtained for a period of at least three (3) years following completion of the project.

Contractors Pollution Liability Insurance (If Applicable)- \$1,000,000 per occurrence and \$2,000,000 aggregate or whatever amount is acceptable to the Agency for any exposure to "hazardous materials" as this term is defined in applicable law, including but not limited to waste, asbestos, fungi, bacterial or mold.

Coverage shall apply to bodily injury; property damage, including loss of use of damaged property or of property that has not been physically injured; cleanup costs; and defense, including costs and expenses incurred in the investigation, defense, or settlement of claims.

Agency shall be included as an insured under Contractor's pollution liability insurance.

If coverage is required on a claims-made or claims-made and reported basis, any applicable retroactive or pending & prior litigation dates must precede the effective date of this contract. Continuous coverage shall be maintained, or an extended reporting period shall be obtained for a period of at least three (3) years following completion of the project.

If the scope of services as defined in this contract includes the disposal of any hazardous materials from the job site, Contractor must furnish to Agency evidence of pollution liability insurance maintained by the disposal site operator for losses arising from the insured facility accepting waste under this contract. Coverage certified to the Agency under this section must be maintained in minimum amounts of \$1,000,000 per loss, with an annual aggregate of at least \$2,000,000.

Lower tier sub-subcontractors, Truckers, Suppliers: Evidence confirming lower tier subcontractors, truckers and suppliers are maintaining valid insurance prior to beginning work on the project to meet the requirements set forth herein on Subcontractor, including but not limited to all additional insured



requirements of Subcontractor.

ALL COVERAGES

Coverage shall not be suspended, voided, canceled, or non-renewed by either CONTRACTOR or by the insurer, reduced in coverage or in limits except after thirty (30) days' prior written notice has been given to AGENCY except for ten (10) days' notice for nonpayment of premium.

DEDUCTIBLES AND RETENTIONS

Any deductibles or self-insured retentions that exceed \$100,000.00 per occurrence or claim must be declared to and approved by the Agency's Contracts and Risk Manager and prior to signing this Contract.

Agency is entitled to request and receive additional documentation, financial or otherwise, prior to giving its approval of the deductibles and self-insured retentions. Any changes to the deductibles or self-insured retentions made during the term of this Contract or during the term of any policy must be approved by Agency's Contracts and Purchasing Manager prior to the change taking effect. Contractor is responsible for any losses within deductibles or self-insured retentions.

OTHER INSURANCE PROVISIONS

Should Agency and Contractor agree that higher coverage limits are needed warranting a project policy, project coverage shall be purchased and the premium for limits exceeding the above amount may be borne by Agency. Agency retains the option to purchase project insurance through Contractor's insurer or its own source.

Any failure to comply with reporting provisions of the policies shall not affect coverage provided to Agency, its officers, agents, employees, or volunteers.

ACCEPTABILITY OF INSURERS

Insurance is to be placed with insurers with a Best's rating of no less than A-VII and acceptable to the Agency. Agency, with the approval of the Risk Manager, may accept coverage with carriers having lower Best's ratings upon review of financial information concerning Contractor and insurance carrier. Agency reserves the right to require that Contractor's insurer be a licensed and admitted insurer in the State of Nevada, or meet any applicable state and federal laws and regulations for non-admitted insurance placement.

VERIFICATION OF COVERAGE

Contractor shall furnish Agency with certificates of insurance and with original endorsements affecting coverage required by this contract. The certificates and endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf.

Prior to the start of any Work, Contractor must provide the following documents to City of Sparks, Attention: Purchasing Division, P.O. Box 857, Sparks, NV 89432-0857:

A. Certificate of Insurance. Contractor must provide a Certificate of Insurance form to the City of Sparks to evidence the insurance policies and coverage required of Contractor.

B. Additional Insured Endorsements. An original Additional Insured Endorsement, signed by an authorized insurance company representative, must be submitted to the City of Sparks, by



attachment to the Certificate of Insurance, to evidence the endorsement of the City of Sparks as additional insured.

C. Policy Cancellation Endorsement. Except for ten (10) days' notice for non-payment of premium, each insurance policy shall be endorsed to specify that without thirty (30) days prior written notice to the City of Sparks, the policy shall not be suspended, voided, cancelled or non-renewed, and shall provide that notices required by this paragraph shall be sent by certified mailed to the address specified above. A copy of this signed endorsement must be attached to the Certificate of Insurance. If endorsements are not available, Contractor shall be responsible to provide prior written notice to Agency as soon as practicable upon receipt of any notice of cancellation, non-renewal, reduction in required limits or other material change in the insurance required under this Agreement.

D. Bonds (as Applicable). Bonds as required and/or defined in the original bid documents.

All certificates and endorsements are to be addressed to the City of Sparks, Purchasing Division and be received and approved by Agency before work commences. The Agency reserves the right to require complete certified copies of all required insurance policies at any time.

SUBCONTRACTORS

Contractor shall include all Subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each Subcontractor. All coverages for Subcontractors shall be subject to all the requirements stated herein.

MISCELLANEOUS CONDITIONS

1. Contractor shall be responsible for and remedy all damage or loss to any property, including property of Agency, caused in whole or in part by Contractor, any Subcontractor, or anyone employed, directed, or supervised by Contractor.
2. Nothing herein contained shall be construed as limiting in any way the extent to which Contractor may be held responsible for payment of damages to persons or property resulting from its operations or the operations of any Subcontractors under it, and such coverage and limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Agency in this contract.
3. In addition to any other remedies Agency may have if Contractor fails to provide or maintain any insurance policies or policy endorsements to the extent and within the time herein required, Agency may, at its sole option:
 - a. Purchase such insurance to cover any risk for which Agency may be liable through the operations of Contractor under this Agreement and deduct or retain the amount of the premiums for such insurance from any sums due under the Agreement;
 - b. Order Contractor to stop work under this Agreement and/or withhold any payments which become due Contractor here under until Contractor demonstrates compliance with the requirements hereof; or,
 - c. Terminate the Agreement.
4. If Contractor's liability policies do not contain the standard ISO separation of insureds condition, or a substantially similar clause, they shall be endorsed to provide cross-liability



coverage.

18. Liquidated Damages:

If the Product is not delivered/Project is not completed within the time stipulated in the bid, the Contractor shall pay to the Agency as fixed, agreed and liquidated damages for delay and not as a penalty (it being impossible to determine the actual damages occasioned by the delay) **\$AMT** for each _____ day of delay until delivery is completed; the Contractor shall be liable to the Agency for the amount herein. This amount may be deducted from money due or to become due to the Contractor as compensation under this proposal in the event the Contractor fails to meet delivery schedules or product specifications.

19. Material Breach of Contract:

In the event Contractor fails to deliver the product and services as contracted for herein, to the satisfaction of the Agency or otherwise fails to perform any provisions of this Contract, the Agency, after providing five (5) days written notice and Contractor's failure to cure such breach within the time specified in the notice, may without waiving any other remedy, make good the deficiencies and deduct the actual cost of providing alternative products and/or services from payment due the Contractor. Non-performance after the first notice of non-performance shall be considered a material breach of contract.

20. Force Majeure:

Neither party to the Contract shall be held responsible for delay or default caused by fire, riot, acts of God, and/or war which is beyond that party's reasonable control. Agency may terminate the Contract upon written notice after determining such delay or default will reasonably prevent successful performance of the Contract.

21. Termination:

The Agency may terminate the Contract for material breach of contract upon ten (10) days written notice and recover all damages, deducting any amount still due the Contractor from damages owed to the Agency, or seek other remedy including action against all bonds. The Contractor may terminate the Contract for material breach of contract upon thirty (30) days written notice to the Agency.

22. Assignment:

All of the terms, conditions and provisions of this Contract, and any amendments thereto, shall inure to the benefit of and be binding upon the parties hereto, and their respective successors and assigns. The Contractor shall not assign this Contract without the written consent of the Agency which will not be unreasonably withheld.

23. Entire Contract:

This Contract constitutes the entire agreement of the parties and shall supersede all prior offers, negotiations, agreements and contracts whether written or oral. Any modifications to the terms and conditions of this Contract must be in writing and signed by both parties.

24. Severability:

If any part of this Contract is found to be void it will not affect the validity of the remaining terms of this Contract which will remain in full force and effect.



25. Headings:

Paragraph titles or captions contained in this Contract are inserted only as a matter of convenience and for reference only, and in no way define, limit, extend, or describe the scope of this Contract or the intent of any provision herein.

26. Singular Includes the Plural; Gender; Title Reference:

Whenever the singular number is used in this Contract and when required by the context, the same shall include the plural, and the use of any gender, be it masculine, feminine or neuter, shall include all of the genders, and the word "person" or "entity" shall include corporation, firm, partnership, or any other combination or association.

The use of the title "Bidder", "Vendor", "Contractor" or "Consultant" within this contract or associated bid documents shall be deemed interchangeable and shall refer to the person or entity with whom the City of Sparks is contracting for the service or product referenced within this contract.

27. Execution:

The parties agree to execute such additional documents and to take such additional actions as are reasonably necessary or desirable to carry out the purposes hereof. They also agree, acknowledge and represent that all corporate authorizations have been obtained for the execution of this Contract and for the compliance with each and every term hereof. Each undersigned officer, representative or employee represents that he or she has the authority to execute this Contract on behalf of the party for whom he or she is signing.

THIS SPACE INTENTIONALLY LEFT BLANK



IN WITNESS WHEREOF, the Redevelopment Agency of the City of Sparks has caused this Contract to be executed by its officers thereunto duly authorized and the Consultant has subscribed same, all on the day and year first above written.

(Consultant)

REDEVELOPMENT AGENCY of the
CITY OF SPARKS, NEVADA
A Municipal Corporation

By: _____

By: _____
Charlene Bybee, Chairperson

(Title)

APPROVED AS TO FORM

ATTEST:

City Attorney

City Clerk

CITY OF SPARKS, NEVADA - BOND OF FAITHFUL PERFORMANCE

Bid #: _____

Bond #: _____

Surety Rating: _____

NV License #: _____

Appt. Agent Countersigning - List below with address

KNOW ALL MEN BY THESE PRESENTS: That WHEREAS, the City of Sparks in the State of Nevada has awarded to **CONTRACTORNAME** hereinafter designated as the "Principal" a contract for Bid # **BIDNUMBER**, PWP # **PWPNUMBER**, for the **TITLE** and

WHEREAS, said Principal is required under the terms of said contract to furnish a bond for the faithful and proper performance of the Contract and the Bonding Company has an "A" or better rating with Moody's or A.M. Best and T-Listed with the U.S. Treasury Department;

NOW, THEREFORE, we the Principal and _____ as Surety, are held and firmly bound unto the City of Sparks in the State of Nevada, in the penal sum of **WRITTENAMOUNT** dollars (**\$AMOUNT**), lawful money of the United States, being not less than one hundred percent (100%) of the estimated contract cost of the work, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if the above bound Principal, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and faithfully perform the covenants, conditions and agreements in the said contract and any alterations made as therein provided on his or their part to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the City of Sparks in the State of Nevada, its officers and agents as therein stipulated, then this obligation shall become null and void; otherwise, it shall be and remain in full force and virtue.

As a condition precedent to the satisfactory completion of the said contract, the above obligation shall hold good for a period of one (1) year after the completion and acceptance of the said work, during which time, if the above bounden principal, his or its heirs, executors, administrators, successors or assigns shall fail to make full, complete and satisfactory repair and replacements or totally protect the said City of Sparks in the State of Nevada from loss or damage made evident during said period of one (1) year from the date of acceptance of said works, and resulting from or caused by defective materials or faulty workmanship in the prosecution of the work done, the obligation in the said sum of **WRITTENAMOUNT** dollars (**\$AMOUNT**), shall remain in full force and virtue; otherwise the above obligation shall be void.

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

IN WITNESS WHEREOF, the above bound parties have executed this instrument under their seals this ____ day of _____, 20__, the name and corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Principal

By _____

Surety

By _____

CITY OF SPARKS, NEVADA – Payment Bond – Labor & Materials

Bid #: _____

Bond #: _____

Surety Rating: _____

NV License #: _____

Appt. Agent Countersigning - List below with address

KNOW ALL MEN BY THESE PRESENTS: That WHEREAS, the City of Sparks in the State of Nevada, has awarded to **CONTRACTORNAME** hereinafter designated as the "Principal" a contract for Bid # **BIDNUMBER**, PWP # **PWPNUMBER**, for the **TITLE** and

WHEREAS, said Principal is required under the terms of said contract to furnish a Bond for the faithful and proper performance of the Contract and the Bonding Company has an "A" or better rating with Moody's or A.M. Best and T-Listed with the U.S. Treasury Department;

NOW, THEREFORE, we, the Principal, and _____ as Surety, are held and firmly bound unto the City of Sparks in the State of Nevada, in the penal sum of **WRITTENAMOUNT** dollars (**\$AMOUNT**), lawful money of the United States, being not less than one hundred percent (100%) of the estimated contract cost of the work for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally firmly by these presents.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH that if the above bounden principal, his or its heirs, executors, administrators, successors, or assigns, shall fail to pay for any materials, provisions, provender or other supplies, implements, or machinery used in, upon, for, or about the performance of the work contracted to be done or for any work or labor thereon of any kind, or for amounts due under the Unemployment Compensation Law with respect to such work or labor as required by the provisions of NRS 612, and provided that the claimant shall have complied with the provisions of said law, the Surety hereon will pay for the same within thirty (30) calendar days an amount not exceeding the sum specified in this bond, then the above obligation shall be null and void; otherwise to remain in full force and account. In case suit is brought upon this bond, the said Surety agrees to pay a reasonable attorney's fees to be fixed by the Court.

The Bond shall insure to the benefit of any and all persons, companies and corporations entitled to file claims under NRS 339 as to give a right of action to them or their assigns in any suit brought upon this Bond.

IN WITNESS WHEREOF, the above bound parties have executed this instrument under their seals this ____ day of _____, 20____, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Principal

By _____

Surety

By _____