

Contract Routing Form

ROUTING: Routine

printed on: 09/11/2017

Contract between: J. P. Cullen & Sons Inc
 and Dept. or Division: Engineering Division
 Name/Phone Number:

Project: Judge Doyle Garage

Contract No.: 7952
 Enactment No.: RES-17-00698
 Dollar Amount: 29,968,853.00

File No.: 48326
 Enactment Date: 09/08/2017

(Please DATE before routing)

Signatures Required	Date Received	Date Signed
City Clerk	9-12-2017	9-12-2017
Director of Civil Rights	9.12.17	9.20.2017 ^{FMS}
Risk Manager	9-20-17	9/29/17 ^{EN}
Finance Director	9-29-17	9/29/17 ^{MCR}
City Attorney	1270 9-15-17	9-15-17
Mayor	9-15-17	9-15-17

Please return signed Contracts to the City Clerk's Office
 Room 103, City-County Building for filing.

Original + 2 Copies

09/11/2017 10:35:51 enknb - D Schaller - 243-5891

Dis Rights: OK / N/A / Problem - Hold
 Prev Wage: AA / Agency / No
 Contract Value: 29,968,853
 AA Plan: Approved
 Amendment / Addendum # N/A
 Type: POS / Dwp / Sbdv / Gov't /
 Grant / PW / Goal / Loan / Agrmt



Legislation Details (With Text)

File #: 48326 **Version:** 1 **Name:** Awarding Public Works Contract No. 7952, Judge Doyle Garage.

Type: Resolution **Status:** Passed

File created: 8/4/2017 **In control:** BOARD OF PUBLIC WORKS

On agenda: 9/5/2017 **Final action:** 9/5/2017

Enactment date: 9/8/2017 **Enactment #:** RES-17-00698

Title: Awarding Public Works Contract No. 7952, Judge Doyle Garage.

Sponsors: BOARD OF PUBLIC WORKS

Indexes:

Code sections:

Attachments: 1. Contract 7952.pdf

Date	Ver.	Action By	Action	Result
9/5/2017	1	COMMON COUNCIL	Adopt Under Suspension of Rules 2.04, 2.05, 2.24, and 2.25	Pass
8/23/2017	1	BOARD OF PUBLIC WORKS		
8/4/2017	1	Engineering Division	Refer	

The proposed resolution authorizes the award of Public Works Contract No. 7952, Judge Doyle Garage. The total estimated cost is \$32.366 million. The Parking Utility capital budget includes \$43.1 million authorized for this project (Munis project 11471) funded by Parking Utility Reserves (\$19.1m) and TIF (\$24m). Funding is available in the project for the contract.

Awarding Public Works Contract No. 7952, Judge Doyle Garage.

BE IT RESOLVED, that the following low bids for miscellaneous improvements be accepted and that the Mayor and City Clerk be and are hereby authorized and directed to enter into a contract with the low bidders contained herein, subject to the Contractor's compliance with Section 39.02 of the Madison General Ordinances concerning compliance with the Affirmative Action provisions **and subject to the Contractor's compliance with Section 33.07 of the Madison General Ordinances regarding Best Value Contracting:**

BE IT FURTHER RESOLVED, that the funds be encumbered to cover the cost of the projects contained herein.

See attached document (Contract No. 7952) for itemization of bids.

SD

PROJECT _____ CONTRACTOR _____ AMOUNT OF BID _____

CONTRACT NO. 7952
JUDGE DOYLE GARAGE
(BASE BID PLUS ALTERNATE NO. 1)

J.P. CULLEN & SONS, INC.

\$29,968,853.00

Acct. No. 11471-82-140:53310(15553)
Contingency 8%±

\$29,968,853.00
2,397,507.00

GRAND TOTAL

\$32,366,360.00

Demographics

Company Name: Travelers Casualty and Surety Company of America
Short Name:
SBS Company Number: 54218780
NAIC CoCode: 31194
FEIN: 06-0907370
Domicile Type: Foreign
State of Domicile: Connecticut
Country of Domicile: United States
NAIC Group Number: 3548 - Travelers Grp
Organization Type: Stock
Date of Incorporation: 07/18/1974
Merger Flag: Yes

Address

Business Address

One Tower Sq
 Hartford, CT 06183
 United States

Mailing Address

ONE TOWER SQUARE
 HARTFORD, CT 06183
 United States

Statutory Home Office Address

One Tower Sq
 Hartford, CT 06183
 United States

Main Administrative Office Address

One Tower Sq
 Hartford, CT 06183
 United States

Phone, E-mail, Website

Phone

Type	Number
Business Primary Phone	(860) 277-0111
Mailing Primary Phone	(860) 277-0111
Mailing Fax Phone	(860) 277-7002
Statutory Home Office Primary Phone	(860) 277-0111
Main Admin Office Primary Phone	(860) 277-0111

Email

No results found.

Website

No results found.

Company Type

Company Type: Property and Casualty
Status: Active
Status Reason:
Status Date: 09/10/1975
Effective Date: 07/01/1997
Legacy State ID: 110846
Issue Date: 09/10/1975
Approval Date:
File Date:
Articles of Incorporation Received: No
Article No:
COA Number:

Appointments

Q sq

Licensee Name	License Number	NPN	License Type	Line of Authority	Appointment Date	Effective Date	Expiration Date
ROSS SQUIRES	8729812	8729812	Intermediary (Agent) Individual	Casualty	05/27/2014	03/01/2017	02/28/2018
SANDRA VASQUEZ	4647249	4647249	Intermediary (Agent) Individual	Casualty	04/06/2011	03/01/2017	02/28/2018
ROSS SQUIRES	8729812	8729812	Intermediary (Agent) Individual	Property	05/27/2014	03/01/2017	02/28/2018
SANDRA VASQUEZ	4647249	4647249	Intermediary (Agent) Individual	Property	04/06/2011	03/01/2017	02/28/2018

First Previous 1 Next Last

Line Of Business

Q Filter

Line of Business	Citation Type	Effective Date
Aircraft	Aircraft	09/10/1975
Automobile	Automobile	09/10/1975
Credit Insurance	Credit Insurance	09/10/1975
Disability Insurance	Disability Insurance	09/10/1975
Fidelity Insurance	Fidelity Insurance	09/10/1975

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First Previous **1** 2 Next Last

Contact

Q Filter

Contact Type	Preferred Name	Name	E-mail	Phone	Address
Registered Agent for Service of Process		*			Other CORPORATION SERVICE COMPANY 8040 EXCELSIOR DR STE 400 MADISON, WI 53717 United States

First Previous **1** Next Last

Company Merger

Q Filter

SBS Company Number	NAIC CoCode	Non-Surviving Company	Non-Surviving Company Type	Terminated Appointments	Transferred Appointments	Merger Date	Comments
54221052	22535	Seaboard Surety Company	Property and Casualty	N	N	01/02/2009	

Companies Absorbed

First Previous 1 Next Last

Name Change History

Previous Name	New Name	Effective Date
	Aetna Casualty & Surety Company of America	09/10/1975
Aetna Casualty & Surety Company of America	Travelers Casualty and Surety Company of America	07/01/1997

First Previous 1 Next Last

\$29,968,853.00
FILE

BID OF J. P. CULLEN & SONS, INC.

2017

PROPOSAL, CONTRACT, BOND AND SPECIFICATIONS

FOR

JUDGE DOYLE GARAGE

CONTRACT NO. 7952

MUNIS NO.11471

IN

MADISON, DANE COUNTY, WISCONSIN

AWARDED BY THE COMMON COUNCIL
MADISON, WISCONSIN ON SEPTEMBER 5, 2017

CITY ENGINEERING DIVISION
1600 EMIL STREET
MADISON, WISCONSIN 53713

<https://bidexpress.com/login>

JUDGE DOYLE GARAGE
CONTRACT NO. 7952

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Exhibits Available in Bid Express:

- Exhibit A – Plans Dated 6/23/17
- Exhibit B – Specs Vol. I Dated 6/23/17
- Exhibit C – Specs Vol. II Dated 6/23/17
- Exhibit D –Geotechnical Report Dated 6/2/17
- Exhibit E – Letter from Mayor Soglin
- Exhibit F – Checklist for PW Bid Submittal 170210

This Proposal, and Agreement have
been prepared by:

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



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

RFP: ds

SECTION A: ADVERTISEMENT FOR BIDS AND INSTRUCTIONS TO BIDDERS

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

A BEST VALUE CONTRACTING MUNICIPALITY

PROJECT NAME:	JUDGE DOYLE GARAGE
CONTRACT NO.:	7952
SBE GOAL	8%
BID BOND	5%
PRE BID (SBE) MEETING (1:00 P.M.)	JULY 21, 2017
PRE BID (CONTRACTORS) MEETING (8:30 – 10:00 AM)	JULY 19, 2017
BIDDER QUESTIONS, CLARIFICATIONS AND REQUESTS FOR SUBSTITUTIONS (3:30 PM)	JULY 21, 2017
PREQUALIFICATION APPLICATION DUE (1:00 P.M.)	JULY 28, 2017
BID SUBMISSION (1:00 P.M.)	AUGUST 4, 2017
BID OPEN (1:30 P.M.)	AUGUST 4, 2017
PUBLISHED IN WSJ	JUNE 23, 30 & JULY 7, 14, 21 & 28

PRE BID MEETING: Representatives of the Affirmative Action Department will be present to discuss the Small Business Enterprise requirements at 1600 Emil Street, Madison Wisconsin.

PRE-BID (CONTRACTORS): A pre-bid meeting will be conducted on Wednesday, July 19, 2017 from 8:30 to 10:00 AM and all bidding contractors are encouraged to attend. This will be an opportunity for bidding contractors to ask questions regarding the project. Please meet in the City/County Building (CCB) at 210 Martin Luther King Jr. Boulevard conference room 118 (please enter through the double glass doors from the corridor). Following the meeting at CCB we will proceed to the site if any contractors are interested in doing so. The City Construction Manager (CCM) will be in attendance at both meeting places.

BIDDER QUESTIONS, CLARIFICATIONS, AND REQUESTS FOR SUBSTITUTIONS:

If needed, Lothan Van Hook Destefano Architecture (LVDA) and/or the City Construction Manager (CCM) shall publish addenda to respond to any questions, clarifications, or requests for substitutions.

- Any questions or requests for clarifications regarding plans and specifications shall be submitted directly to LVDA and the CCM. Responses that change the contract scope and/or schedule will be published by LVDA and/or the CCM in the form of a bidding addendum.
- Requests for substitutions shall be done according to Specification 01 25 13 Product Substitution Procedures and other specifications as necessary. Use the form at the end of the specification. Contractors are cautioned to review all specifications and note whether substitutions for specific products will be allowed or not.
- See the contract contact information at the end of Section D-Special Provisions for contact information. All questions and/or substitution requests shall be sent via email, reference Judge Doyle Garage (JDG) – City Contract #7952.
- **The deadline for receiving all questions, clarifications, and requests for substitutions shall be as indicated in the schedule table above.**

PREQUALIFICATION APPLICATION: Forms are available on our website, www.cityofmadison.com/business/pw/forms.cfm. If not currently prequalified in the categories listed in Section A, an amendment to your Prequalification will need to be submitted prior to the same due date. Postmark is not applicable.

BIDS TO BE SUBMITTED by hand to 1600 EMIL ST., MADISON, WI 53713 or online at www.bidexpress.com.

THE BID OPENING is at 1600 EMIL ST., MADISON, WI 53713.

STANDARD SPECIFICATIONS

The City of Madison's Standard Specifications for Public Works Construction - 2017 Edition, as supplemented and amended from time to time, forms a part of these contract documents as if attached hereto.

These standard specifications are available on the City of Madison Public Works website, www.cityofmadison.com/Business/PW/specs.cfm.

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

SECTION 102.1: PRE-QUALIFICATION OF BIDDERS

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

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

In accordance with Section 39.02(9)(a)l. of the General Ordinances, all bidders shall submit in writing to the Affirmative Action Division Manager of the City of Madison, a Certificate of Compliance or an Affirmative Action Plan at the same time or prior to the submission of the proof of responsibility forms.

The bidder shall be disqualified if the bidder fails to or refuses to, prior to opening of the bid, submit a Certificate of compliance, Affirmative Action Plan or Affirmative Action Data Update, as applicable, as defined by Section 39.02 of the General Ordinances (entitled Affirmative Action) and as required by Section 102.11 of the Standard Specifications.

SECTION 102.4 PROPOSAL

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

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

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

A proposal submitted by an individual shall be signed by the bidder or by a duly authorized agent. A proposal submitted by a partnership shall be signed by a member/partner or by a duly authorized agent thereof. A proposal submitted by a corporation shall be signed by an authorized officer or duly authorized registered agent of such corporation, and the proposal shall show the name of the State under the laws of which such corporation was chartered. The required signatures shall in all cases appear in the space provided thereof on the proposal.

Each proposal shall be placed, together with the proposal guaranty, in a sealed envelope, so marked as to indicate name of project, the contract number or option to which it applies, and the name and address

of the Contractor or submitted electronically through Bid Express (www.bidexpress.com). Proposals will be accepted at the location, the time and the date designated in the advertisement. Proposals received after the time and date designated will be returned to the bidder unopened.

SECTION 102.5: BID DEPOSIT (PROPOSAL GUARANTY)

All bids, sealed or electronic, must be accompanied with a Bid Bond equal to at least 5% of the bid or a Certificate of Annual/Biennial Bid Bond or certified check, payable to the City Treasurer. Bid deposit of the successful bidders shall be returned within forty-eight (48) hours following execution of the contract and bond as required.

MINOR DISCREPENCIES

Bidder is responsible for submitting all forms necessary for the City to determine compliance with State and City bidding requirements. Notwithstanding any language to the contrary contained herein, the City may exercise its discretion to allow bidders to correct or supplement submissions after bid opening, if the minor discrepancy, bid irregularity or omission is insignificant and not one related to price, quality, quantity, time of completion or performance of the contract.

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

Building Demolition

- 101 Asbestos Removal
- 120 House Mover

- 110 Building Demolition

Street, Utility and Site Construction

- 201 Asphalt Paving
- 205 Blasting
- 210 Boring/Pipe Jacking
- 215 Concrete Paving
- 220 Con. Sidewalk/Driv & Gutter/Misc. Flat Work
- 221 Concrete Basins and Other Concrete Work
- 222 Concrete Removal
- 225 Grading
- 230 Fencing
- 235 Fiber Optic Cable/Conduit Installation
- 240 Grading and Earthwork
- 241 Horizontal Saw Cutting of Sidewalk
- 242 Infrared Seamless Patching
- 245 Landscaping, Maintenance
- 246 Ecological Restoration
- 250 Landscaping, Site and Street
- 251 Parking Ramp Maintenance
- 252 Pavement Marking
- 255 Pavement Sealcoating and Crack Sealing
- 260 Petroleum Above/Below Ground Storage Tank Removal/Installation
- 262 Playground Installer

- 265 Retaining Walls, Precast Modular Units
- 270 Retaining Walls, Reinforced Concrete
- 275 Sanitary, Storm Sewer and Water Main Construction
- 276 Sawcutting
- 280 Sewer Lateral Drain Cleaning/Internal TV Insp.
- 285 Sewer Lining
- 290 Sewer Pipe Bursting
- 295 Soil Borings
- 300 Soil Nailing
- 305 Storm & Sanitary Sewer Laterals & Water Svc.
- 310 Street Construction
- 315 Street Lighting
- 318 Tennis Court Resurfacing
- 320 Traffic Signals
- 325 Traffic Signing & Marking
- 332 Tree pruning/removal
- 333 Tree, pesticide treatment of
- 335 Trucking
- 340 Utility Transmission Lines including Natural Gas, Electrical & Communications
- 399 Other _____

Bridge Construction

- 501 Bridge Construction and/or Repair

Building Construction

- 401 Floor Covering (including carpet, ceramic tile installation, rubber, VCT)
- 402 Building Automation Systems
- 403 Concrete
- 404 Doors and Windows
- 405 Electrical - Power, Lighting & Communications
- 410 Elevator - Lifts
- 412 Fire Suppression
- 413 Furnishings - Furniture and Window Treatments
- 415 General Building Construction, Equal or Less than \$250,000
- 420 General Building Construction, \$250,000 to \$1,500,000
- 425 General Building Construction, Over \$1,500,000
- 428 Glass and/or Glazing
- 429 Hazardous Material Removal
- 430 Heating, Ventilating and Air Conditioning (HVAC)
- 433 Insulation - Thermal
- 435 Masonry/Tuck pointing

- 437 Metals
- 440 Painting and Wallcovering
- 445 Plumbing
- 450 Pump Repair
- 455 Pump Systems
- 460 Roofing and Moisture Protection
- 464 Tower Crane Operator
- 461 Solar Photovoltaic/Hot Water Systems
- 465 Soil/Groundwater Remediation
- 466 Warning Sirens
- 470 Water Supply Elevated Tanks
- 475 Water Supply Wells
- 480 Wood, Plastics & Composites - Structural & Architectural
- 499 Other _____

State of Wisconsin Certifications

- 1 Class 5 Blaster - Blasting Operations and Activities 2500 feet and closer to inhabited buildings for quarries, open pits and road cuts.
- 2 Class 6 Blaster - Blasting Operations and Activities 2500 feet and closer to inhabited buildings for trenches, site excavations, basements, underwater demolition, underground excavations, or structures 15 feet or less in height.
- 3 Class 7 Blaster - Blasting Operations and Activities for structures greater than 15' in height, bridges, towers, and any of the objects or purposes listed as "Class 5 Blaster or Class 6 Blaster".
- 4 Petroleum Above/Below Ground Storage Tank Removal and Installation (Attach copies of State Certifications.)
- 5 Hazardous Material Removal (Contractor to be certified for asbestos and lead abatement per the Wisconsin Department of Health Services, Asbestos and Lead Section (A&LS).) See the following link for application: www.dhs.wisconsin.gov/Asbestos/Cert. State of Wisconsin Performance of Asbestos Abatement Certificate must be attached.
- 6 Certification number as a Certified Arborist or Certified Tree Worker as administered by the International Society of Arboriculture
- 7 Pesticide application (Certification for Commercial Applicator For Hire with the certification in the category of turf and landscape (3.0) and possess a current license issued by the DATCP)
- 8 State of Wisconsin Master Plumbers License.

SECTION B: PROPOSAL

Please refer to the
Bid Express Website
at <https://bidexpress.com>
look up contract number
and go to
Section B: Proposal Page

You can access all City of Madison bid solicitations for FREE at www.bidexpress.com

Click on the "Register for Free" button and follow the instructions to register your company and yourself. You will be asked for a payment subscription preference, since you may wish to bid online someday. Simply choose the method to pay on a 'per bid' basis. This requires no payment until / unless you actually bid online. You can also choose the monthly subscription plan at this time. You will, however, be asked to provide payment information. Remember, you can change your preference at anytime. You will then be able to complete your free registration and have full access to the site. Your free access does not require completion of the 'Digital ID' process, so you will have instant access for viewing and downloading. To be prepared in case you ever do wish to bid online, you may wish to establish your digital ID also, since you cannot bid without a Digital ID.

If you have any problems with the free registration process, you can call the bidexpress help team, toll free at 1-888-352-2439 (option 1, option1).

SECTION C: SMALL BUSINESS ENTERPRISE

Instructions to Bidders City of Madison SBE Program Information

2 Small Business Enterprise (SBE) Program Information

2.1 Policy and Goal

The City of Madison reaffirms its policy of nondiscrimination in the conduct of City business by maintaining a procurement process which remains open to all who have the potential and ability to sell goods and services to the City. It is the policy of the City of Madison to allow Small Business Enterprises (SBE) maximum feasible opportunity to participate in City of Madison contracting. The bidder acknowledges that its bid has been submitted in accordance with the SBE program and is for the public's protection and welfare.

Please refer to the "ADVERTISEMENT FOR BIDS" for the goal for the utilization of SBEs on this project. SBEs may participate as subcontractors, vendors and/or suppliers, which provide a commercially useful function. The dollar value for SBE suppliers or 'materials only' vendors shall be discounted to 60% for purposes of meeting SBE goals.

A bidder which achieves or exceeds the SBE goal will be in compliance with the SBE requirements of this project. In the event that the bidder is unable to achieve the SBE goal, the bidder must demonstrate that a good faith effort to do so was made. Failure to either achieve the goal or demonstrate a good faith effort to do so will be grounds for the bidder being deemed a non-responsible contractor ineligible for award of this contract.

A bidder may count towards its attainment of the SBE goal only those expenditures to SBEs that perform a commercially useful function. For purposes of evaluating a bidder's responsiveness to the attainment of the SBE goal, the contract participation by an SBE is based on the percentage of the total base bid proposed by the Contractor. The total base bid price is inclusive of all addenda.

Work performed by an SBE firm in a particular transaction can be counted toward the goal only if it involves a commercially useful function. That is, in light of industry practices and other relevant considerations, does the SBE firm have a necessary and useful role in the transaction, of a kind for which there is a market outside the context of the SBE Program, or is the firm's role a superfluous step added in an attempt to obtain credit towards goals? If, in the judgment of the Affirmative Action Division, the SBE firm will not perform a commercially useful function in the transaction, no credit towards goals will be awarded.

The question of whether a firm is performing a commercially useful function is completely separate from the question of whether the firm is an eligible SBE. A firm is eligible if it meets the definitional criteria and ownership and control requirements, as set forth in the City of Madison's SBE Program.

If the City of Madison determines that the SBE firm is performing a commercially useful function, then the City of Madison must then decide what that function is. If the commercially useful function is that of an SBE vendor / supplier that regularly transacts business with the respective product, then the City of Madison will count 60% of the value of the product supplied toward SBE goals.

To be counted, the SBE vendor / supplier must be engaged in selling the product in question to the public. This is important in distinguishing an SBE vendor / supplier, which has a regular trade with a variety of customers, from a firm which performs supplier-like functions on an ad hoc basis or for only one or two contractors with whom it has a special relationship.

A supplier of bulk goods may qualify as an eligible SBE vendor / supplier if it either maintains an inventory or owns or operates distribution equipment. With respect to the distribution equipment; e.g., a fleet of trucks, the term "operates" is intended to cover a situation in which the supplier leases the equipment on a regular basis for its entire business. It is not intended to cover a situation in which the firm simply provides drivers for trucks owned or leased by another party; e.g., a prime contractor, or leases such a party's trucks on an ad hoc basis for a specific job.

If the commercially useful function being performed is not that of a qualified SBE vendor / supplier, but rather that of delivery of products, obtaining bonding or insurance, procurement of personnel, acting as a broker or manufacturer's representative in the procurement of supplies, facilities, or materials, etc., only the fees or commissions will apply towards the goal.

For example, a business that simply transfers title of a product from manufacturer to ultimate purchaser; e. g., a sales representative who re-invoices a steel product from the steel company to the Contractor, or a firm that puts a product into a container for delivery, would not be considered a qualified SBE vendor / supplier. The Contractor would not receive credit based on a percentage of the cost of the product for working with such firms.

Concerning the use of services that help the Contractor obtain needed supplies, personnel, materials or equipment to perform a contract: only the fee received by the service provider will be counted toward the goal. For example, use of a SBE sales representative or distributor for a steel company, if performing a commercially useful function at all, would entitle the Contractor receiving the steel to count only the fee paid to the representative or distributor toward the goal. This provision would also govern fees for professional and other services obtained expressly and solely to perform work relating to a specific contract.

Concerning transportation or delivery services: if an SBE trucking company picks up a product from a manufacturer or a qualified vendor / supplier and delivers the product to the Contractor, the commercially useful function it is performing is not that of a supplier, but simply that of a transporter of goods. Unless the trucking company is itself the manufacturer or a qualified vendor / supplier in the product, credit cannot be given based on a percentage of the cost of the product. Rather, credit would be allowed for the cost of the transportation service.

The City is aware that the rule's language does not explicitly mention every kind of business that may contribute work on this project. In administering these programs, the City would, on a case-by-case basis, determine the appropriate counting formula to apply in a particular situation.

2.2 Contract Compliance

Questions concerning the SBE Program shall be directed to the Contract Compliance Officer of the City of Madison Department of Civil Rights, Affirmative Action Division, 210 Martin Luther King, Jr. Blvd., Room 523, Madison, WI 53703; telephone (608) 266-4910.

2.3 Certification of SBE by City of Madison

The Affirmative Action Division maintains a directory of SBEs which are currently certified as such by the City of Madison. Contact the Contract Compliance Officer as indicated in Section 2.2 to receive a copy of the SBE Directory or you may access the SBE Directory online at www.cityofmadison.com/dcr/aaTBDDir.cfm.

All contractors, subcontractors, vendors and suppliers seeking SBE status must complete and submit the **Targeted Business Certification Application** to the City of Madison Affirmative Action Division by the time and date established for receipt of bids. A copy of the Targeted Business Certification Application is available by contacting the Contract Compliance Officer at the address and telephone indicated in Section 2.2 or you may access the Targeted Business Certification Application online at www.cityofmadison.com/dcr/aaTBDDir.cfm. Submittal of the Targeted Business Certification Application by the time specified does not guarantee that the applicant will be certified as a SBE eligible to be utilized towards meeting the SBE goal for this project.

2.4 Small Business Enterprise Compliance Report

2.4.1 Good Faith Efforts

Bidders shall take all necessary affirmative steps to assure that SBEs are utilized when possible and that the established SBE goal for this project is achieved. A contractor who self performs a portion of the work, and is pre-qualified to perform that category of work, may subcontract that portion of the work, but shall not be required to do so. When a bidder is unable to achieve the established SBE goal, the bidder must demonstrate that a good faith effort to do so was made. Such a good faith effort should include the following:

- 2.4.1.1 Attendance at the pre-bid meeting.
- 2.4.1.2 Using the City of Madison's directory of certified SBEs to identify SBEs from which to solicit bids.
- 2.4.1.3 Assuring that SBEs are solicited whenever they are potential sources.
- 2.4.1.4 Referring prospective SBEs to the City of Madison Affirmative Action Division for certification.
- 2.4.1.5 Dividing total project requirements into smaller tasks and/or quantities, where economically feasible, to permit maximum feasible SBE participation.
- 2.4.1.6 Establishing delivery schedules, where requirements permit, which will encourage participation by SBEs.
- 2.4.1.7 Providing SBEs with specific information regarding the work to be performed.
- 2.4.1.8 Contacting SBEs in advance of the deadline to allow such businesses sufficient time to prepare a bid.
- 2.4.1.9 Utilizing the bid of a qualified and competent SBE when the bid of such a business is deemed reasonable (i.e. 5% above the lowest bidder), although not necessarily low.
- 2.4.1.10 Contacting SBEs which submit a bid, to inquire about the details of the bid and confirm that the scope of the work was interpreted as intended.
- 2.4.1.11 Completion of Cover Page (page C-6), Summary Sheet (page C-7) and SBE Contact Reports (pages C-8 and C9) if applicable.

2.4.2 Reporting SBE Utilization and Good Faith Efforts

The Small Business Enterprise Compliance Report is to be submitted by the bidder with the bid: This report is due by the specified bid closing time and date. Bids submitted without a completed SBE Compliance Report as outlined below may be deemed non-responsible and the bidder ineligible for award of this contract. Notwithstanding any language to the contrary contained herein, the City may exercise its discretion to allow bidders to correct or supplement submissions after bid opening, if the minor discrepancy, bid irregularity or omission is insignificant and not one related to price, quality, quantity, time of completion, performance of the contract, or percentage of SBE utilization.

2.4.2.1 If the Bidder meets or exceeds the goal established for SBE utilization, the Small Business Enterprise Compliance Report shall consist of the following:

2.4.2.1.1 **Cover Page**, Page C-6; and

2.4.2.1.2 **Summary Sheet**, C-7.

2.4.2.2 If the bidder does not meet the goal established for SBE utilization, the Small Business Enterprise Compliance Report shall consist of the following:

2.4.2.2.1 **Cover Page**, Page C-6;

2.4.2.2.2 **Summary Sheet**, C-7; and

2.4.2.2.3 **SBE Contact Report**, C-8 and C-9. (A separate Contact Report must be completed for each applicable SBE which is not utilized.)

2.5 Appeal Procedure

A bidder which does not achieve the established goal and is found non-responsible for failure to demonstrate a good faith effort to achieve such goal and subsequently denied eligibility for award of contract may appeal that decision to the Small Business Enterprises Appeals Committee. All appeals shall be made in writing, and shall be delivered to and received by the City Engineer no later than 4:30 PM on the third business day following the bidder's receipt of the written notification of ineligibility by the Affirmative Action Division Manager. Postmark not acceptable. The notice of appeal shall state the basis for the appeal of the decision of the Affirmative Action Division Manager. The Appeal shall take place in accordance with Madison General Ordinance 33.54.

2.6 SBE Requirements After Award of the Contract

The successful bidder shall identify SBE subcontractors, suppliers and vendors on the subcontractor list in accordance with the specifications. The Contractor shall submit a detailed explanation of any variances between the listing of SBE subcontractors, vendors and/or suppliers on the subcontractor list and the Contractor's SBE Compliance Report for SBE participation.

No change in SBE subcontractors, vendors and/or suppliers from those SBEs indicated in the SBE Compliance Report will be allowed without prior approval from the Engineer and the Affirmative Action Division. The contractor shall submit in writing to the City of Madison Affirmative Action Division a request to change any SBE citing specific reasons which necessitate such a change. The Affirmative Action Division will use a general test of reasonableness in approving or rejecting the contractor's request for change. If the request is approved, the Contractor will make every effort to utilize another SBE if available.

The City will monitor the project to ensure that the actual percentage commitment to SBE firms is carried out.

2.7 SBE Definition and Eligibility Guidelines

A Small Business Enterprise is a business concern awarded certification by the City of Madison. For the purposes of this program a Small Business Enterprise is defined as:

- A. An independent business operated under a single management. The business may not be a subsidiary of any other business and the stock or ownership may not be held by any individual or any business operating in the same or a similar field. In determining whether an entity qualifies as a SBE, the City shall consider all factors relevant to being an independent business including, but not limited to, the date the business was established, adequacy of its resources for the work in which it proposes to involve itself, the degree to which financial, equipment leasing and other relationships exist with other ineligible firms in the same or similar lines of work. SBE owner(s) shall enjoy the customary incidents of ownership and shall share in the risks and profits commensurate with their enjoyment interests, as demonstrated by an examination of the substance rather than form or arrangements that may be reflected in its ownership documents.
- B. A business that has averaged no more than \$4.0 million in annual gross receipts over the prior three year period and the principal owner(s) do not have a personal net worth in excess of \$1.32 million.

Firm and/or individuals that submit fraudulent documents/testimony may be barred from doing business with the City and/or forfeit existing contracts.

SBE certification is valid for one (1) year unless revoked.

SECTION D: SPECIAL PROVISIONS

JUDGE DOYLE GARAGE CONTRACT NO. 7952

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

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

ARTICLE 102.9

BIDDER'S UNDERSTANDING

Tax Exempt Status: Exclusive with all contracts executed after January 1, 2016, the sales price from the sale, storage, use or other consumption of tangible personal property that is used in conjunction with a public works improvement for a tax exempt entity (including the City of Madison), is exempt from State sales tax. Said property must become a component of the project owned by the tax exempt entity and includes: any building; shelter; parking lot; parking garage; athletic field; storm sewer; water supply system; or sewerage and waste water treatment facility, but does not include a highway, street or road. The contractor shall ensure that the exemption for sales and use tax available under Wis. Stat. Sec.

77.54(9m) applies where available. The contractor shall provide all necessary documentation as required by the State of Wisconsin and the City of Madison to comply with this exemption.

See link to Wisconsin Department of Revenue Tax Bulletin, January 2016, Number 192 and 2015 Wis. Act 126 for additional information.

Contractors wishing to sub contract with a non-union Small Business Enterprise (SBE) may encourage the non-union SBE subcontractor to consider entering into a Project Labor Agreement with the subject union specific to the Judge Doyle Garage, to enable the General Contractor to count the participation of the non-union SBE for SBE Goal achievement. Interested SBE Subcontractors may contact the Executive Director, Building and Construction Trades Council of South Central Wisconsin at bttrades@sbcglobal.net or at (608) 256-3161 to discuss entering into such an agreement.

SECTION 102.12

BEST VALUE CONTRACTING

This Contract shall be considered a Best Value Contract if the Contractor's bid is equal to or greater than \$59,000 for a single trade contract; or equal to or greater than \$288,000 for a multi-trade contract pursuant to MGO 33.07(7).

ARTICLE 103 AWARD AND EXECUTION OF THE CONTRACT

The awarded Contractor shall completely execute the signing of all contract documents and submit them to City Engineering (Attn: Alane Boutelle, 1600 Emil Street, Madison, WI 53703) prior to **12:00pm on Thursday, September 7, 2017**. Delays by the Contractor in submitting the required completed contract documents will not adjust the project completion date. Payment and Performance Bonds shall be dated no sooner than **Wednesday, September 6, 2017**.

The bidder must completely fill in the base bid and the alternate. If any responsible bidder submits a base bid plus alternate one (1) that is below the Construction Budget Dollar Value, the City will award the contract based on the base bid plus alternate one (1). If no responsible bidder submits a base bid plus alternate one (1) that is below the Construction Budget Dollar Value, the City will award the contract based on the base bid only. The City shall have the right to proceed or not proceed with alternate one (1) regardless of how the bid was awarded. The City shall have the right to reject all bids regardless of the value of the bids submitted.

ARTICLE 104 SCOPE OF WORK

This contract is for the new concrete framed, post tensioned, parking structure on Block 88. Block 88 is bordered on the west by the Madison Municipal Building, on the north by East Doty Street, on the east by South Pinckney Street, and on the south by East Wilson Street. This new structure will consist of 244,440 SF for 562 parking stalls, support facilities, and a bicycle center on the corner of East Doty Street and South Pinckney Street.

The scope of work includes the furnishing of all labor, materials, equipment, tools, and other services necessary to complete the work in accordance with the intent of this contract. The Contractor shall use properly functioning equipment capable of performing the tasks required. The Contractor shall furnish workers who perform quality work and who are experienced and knowledgeable in the work proposed.

SECTION 104.1 LANDS FOR WORK

General outlines for the Lands for Work for this contract are represented on the Civil drawings. All use of the City Lands for Work – by the Contractor - shall be reviewed and approved by the City's Construction Manager. The Madison Municipal Building Renovation, to the west of this project, will be under construction, concurrently with this project.

Lands for work shall include areas within the property boundaries of the Judge Doyle Garage, known as Block 88.

No tobacco product use is allowed on the Lands for Work.

SECTION 104.2 INTENT AND COORDINATION OF CONTRACT DOCUMENTS

The contract documents are complimentary of each other and consist of all of the following:

- The City Standard Specifications for Public Works Construction, 2017 Edition
- These Special Provisions including all plans and specifications as noted by the exhibits listed below.
- All Addenda to the bidding documents.

EXHIBITS FOR BIDDING PURPOSES:

Exhibit A – Plans Dated 6/23/17

Exhibit B – Specs Vol. I Dated 6/23/17

Exhibit C – Specs Vol. II Dated 6/23/17

Exhibit D – Geotechnical Report Dated 6/23/17

Exhibit E – Letter from Mayor Soglin

Exhibit F - Checklist for PW Bid Submittal 170210

SECTION 105.5 INSPECTION OF WORK

The Contractor shall coordinate directly with any and all regulatory agencies having jurisdiction over the licensing, permitting, and inspection of work as described in the construction documents.

All Contractors shall be familiar with Specification 01 45 16 – Field Quality Control Procedures regarding City of Madison policies and procedures for Quality Assurance and Quality Control.

SECTION 105.6 CONTRACTORS RESPONSIBILITY FOR WORK

The Contractor shall not take advantage of any discrepancy in the plans or specifications. This shall include but not be limited to apparent errors, omissions, and interpretations involving codes, regulations, and standards.

Any Contractor who identifies such a discrepancy during the bidding process shall notify LVDA, the City Project Manager (CPM), and the CCM of the discrepancy prior to the "Questions and Clarifications Deadline" as noted in Section A of the bid documents.

Any Contractor who identifies such a discrepancy after the bidding process and/or after contract signing shall immediately notify LVDA, the CPM, and the CCM in writing and request clarification on how to proceed. See Specification 01 26 13 – Request for Information (RFI).

SECTION 105.7 CONTRACT DOCUMENTS

The General Contractor is responsible for reproducing all construction documents necessary to complete the Work at their own cost. This shall include plans, specifications, and addenda for the General Contractor and all Sub-contractors. The Contractor shall keep one copy of all drawings and Specifications on the project site, in good order, available to the Project Designers and all City representatives.

SECTION 105.9 SURVEYS, POINTS, AND ELEVATIONS

The General Contractor is responsible for providing all survey, benchmarks, points, and elevations required for this project.

SECTION 105.12 COOPERATION BY THE CONTRACTOR

As indicated in section 104.1 LANDS FOR WORK there will be a separate Board of Public Works contract for the Madison Municipal Building renovation. The Contractor for this Work must coordinate with the adjacent contractor to assist in access for both parties.

The Contractor shall notify adjacent property owners for any work affecting neighboring facilities. Contractor shall provide sufficient notification time to avoid any disruption to neighboring facility operations.

The General Contractor shall be responsible for the sequencing of the project.

The Contractor shall review all other specifications within the construction documents for other requirements and coordination of work associated with this contract.

SECTION 107.2 PROTECTION AND RESTORATION OF PROPERTY

The Contractor shall be responsible for the protection and restoration of all new and existing work according to Specification 01 76 00 – PROTECTING INSTALLED CONSTRUCTION.

SECTION 107.4(d) CONTRACTOR'S LIABILITY INSURANCE – UMBRELLA LIABILITY INSURANCE

Umbrella Liability Insurance to be adjusted as follows: The Contractor shall procure and maintain during the life of this Contract Umbrella Liability coverage at least as broad as the underlying Commercial General Liability, Business Automobile Liability and Employers Liability with the minimum limits of \$10,000,000 per occurrence and aggregate.

In addition the insurance requirements listed in this section Contractor must carry the following insurance: Contractor's Pollution Liability Insurance. Contractor shall procure and maintain Contractor's pollution liability insurance coverage for any and all losses arising from or in any way related to pollution conditions, both sudden and accidental and gradual, which arise from Contractor's operations, whether directly or indirectly, or that are in any other way related to Contractor's operations, whether such operations be by Contractor, its subcontractors or anyone directly or indirectly employed by any of them. The pollution liability insurance policy shall contain minimum liability limits of \$2,000,000 per loss, \$4,000,000 aggregate. Liability limits shall be dedicated to the losses described herein and said limits shall not be eroded by the addition of any other party or entity not in conformance with this contract.

The pollution liability insurance policy shall contain or be endorsed to include coverage for the following: (i) bodily injury (including death), property damage and environmental cleanup costs, both on-Site and off-Site; (ii) transportation of any waste, including loading/unloading, from the Site to the final disposal location, with all such disposal locations being scheduled as non-owned disposal sites for coverage under the policy.

SECTION 107.7 MAINTENANCE OF TRAFFIC

All signing and barricading shall conform with the Federal Highways Administrations "Manual on Uniform Traffic Control Devices" (MUTCD) and the City of Madison Standards for sidewalk and bikeway closures and the State of Wisconsin Standard Detail Drawing S.D.D. 15c 11-5

The Contractor shall submit an acceptable Traffic Control Plan, including all necessary phases, to the office of the City Traffic Engineer, a minimum of five (5) working days, prior to the pre-construction meeting. The Traffic Control Plan shall address all requirements of this section of the Special Provisions. The contractor shall work with the City Traffic Engineering Division to develop an approved Traffic Control Plan. The contractor shall not start work on this project until the Traffic Engineering Division has approved a traffic control plan and traffic control devices have been installed, in accordance with the approved plan. Failure of the Contractor to obtain approval of a Traffic Control Plan, as specified above, may prevent the Contractor from starting work and shall be considered a delay of the project, caused by the Contractor. The successful bidder shall work with the City Traffic Engineering Division to develop an approved Traffic Control Plan.

The traffic control plan may need to be altered as conditions change in the field or as unexpected conditions occur. This shall include relocating existing traffic control or providing additional traffic control. This should be considered incidental to providing traffic control for the project.

The Contractor shall not in any manner unnecessarily obstruct the streets or crossings, and shall at all times and under all circumstances provide safe and sufficient means for foot passengers and vehicles.

Construction equipment and materials are not to be stored within the street right-of-way that is open to traffic during non-working hours.

The contractor shall notify (48 hour minimum notice) all residents within the construction limits of this project if the vehicular access is to be cut off to their property.

The work areas shall be backfilled, plated, or protected by traffic control devices during non-working hours. If steel plates are used, the Contractor shall notify the City of Madison Streets Division, 266-4681, 1 working day prior to placement of the plates.

The Contractor shall not remove existing traffic control or street name signs. The Traffic Engineering Field Operations Facility (266-4767) will remove these signs within twenty-four (24) hours, (one work day), upon the Contractor's request.

The contractor shall notify the City of Madison Traffic Operations Section, 266-4767 a minimum of 5 working days prior to opening of a street that has been closed to traffic to permit reinstallation of signs and markings. If landscaping is not complete then the street opening date may be extended to a minimum of 8 days after the landscaping complete. If the street is opened before the installation of permanent signing & marking the contractor shall be responsible for all temporary signs & markings as directed by the City Traffic Engineer.

The Contractor shall perform the work in three phases in order to maintain traffic and pedestrian access to either E Wilson St, S Pinckney St and E Doty St at all times.

The Contractor will need to coordinate with the MMB project. This includes material deliveries, traffic control and other activities where there may be conflicts.

Phase 1 includes the work necessary to complete the underground utility work on E Wilson St. Phase 2 includes the work necessary to complete the underground utility work on S Pinckney St. Phase 3 includes the rest of the work necessary to complete the project.

Phase 1 must be completed prior to starting Phase 2. Work on Phase 3 may begin during Phase 2 as long as it doesn't interfere with pedestrian access along S Pinckney St.

Phase 1

Estimated to last XX days. Installation of utilities on E Wilson St. Contractor may remove limited parking within the project area. Contractor shall maintain at least one lane of traffic on E Wilson St. during this phase. At a minimum a pedestrian walkway shall be maintained at all times on the south side of E. Wilson St.

Phase 2

May begin only after Phase 1 has been completed. Estimated to last XX days. Installation of utilities on S Pinckney St. Contractor may close S Pinckney St within the project area. Contractor shall maintain a pedestrian walkway on at least one side of S Pinckney St at all times.

Phase 3

Estimated to last XX days. All remaining work to complete project.

S Pinckney St:

- May be closed to traffic.
- A pedestrian walkway must be maintained at all times.

E Wilson St:

- Contractor may close sidewalk on the north side of E Wilson within the project limits for the duration of the project.
- Contractor may remove limited parking on the north side of E Wilson within the project limits for the duration of the project.
- Contractor shall maintain two lanes of traffic between 7:00 am – 8:30am and 3:30 pm – 6:00pm.

E Doty St:

- Contractor may remove limited parking on the south side of E Doty St within the project limits for the duration of the project.
- Contractor may close sidewalk on the south side of E Doty St within the project limits for the duration of the project.
- Contractor shall provide a protected pedestrian walkway on the south side of E Doty St. in the existing parking lane. The walkway shall be separated from traffic using concrete barriers and from the work zone with a fence. The walkway shall have a minimum of 6 feet of unobstructed space and be accessible by wheelchair. The walkway must be provided with overhead protection if there is any overhead work above or near this walkway.

Special Events and Work Restrictions

Downtown Madison has several annual special events that may require Contractor to stop work in the street early or provide more space in the street or sidewalk on some days. The days would typically be a Thursday or Friday. Contractor will be notified at least one week in advance when this will be necessary to accommodate certain special events.

The following short list of special events that may require work restrictions: Shake the Lake-Late in June, Art Fair on the Square-Early in July, Ironman-Early in September.

The Contractor shall not in any manner unnecessarily obstruct the streets or crossings, and shall at all times and under all circumstances provide safe and sufficient means for foot passengers and vehicles.

Contractor shall maintain pedestrian movements around or through the construction zone at all at all times, except under direction of the Construction Engineer. Contractor shall clearly delineate area for pedestrians by using barrels or barricades to protect either side of the walking area. Gravel base course material is not acceptable for pedestrian walkways. Gravel areas must be covered with rubber mats to provide a flat, clearly-defined walkway, clear of mud and debris.

The Contractor may remove limited parking within the project limits. The Contractor shall be responsible for posting and maintaining NO PARKING signs in accordance with City of Madison Police Department's "Guidelines for Temporary No Parking Restrictions for Construction or Special Events".

Contact Mark Winter, Traffic Engineering Division, 266-6543, with any questions concerning these traffic control specifications.

SECTION 108.2 PERMITS AND LICENSING

The Contractor shall be required to apply, pay for, and obtain all permits or licenses that may be required by these contract documents regardless of ordinance, statute, or other regulatory requirement.

The Contractor shall obtain and pay for permits and private utility installation fees for this project unless otherwise provided. These costs will include but may not be limited to: gas service/meter set, electric, telephone, and water service/meter set.

The Contractor shall be responsible for compliance with all required permits including the City of Madison Erosion Control permit and the Wisconsin Department of Natural Resources WRAPP Storm Water NOI permit.

The Contractor shall be responsible for any fines issued due to non-compliance with the project permits.

Prior to beginning work in the public right of ways, the Contractor shall obtain and pay for the City of Madison's "Application to Excavate in Public Right-Of-Way Connect to City Sanitary And/Or Storm Sewer". The application is located at <http://www.cityofmadison.com/engineering/permits.cfm>. The City will provide inspections and pay for all City inspections in the public right-of-way. The City inspectors will use Munis code 11471-82-140 to charge staff time for public right-of-way inspections.

SECTION 109.7 TIME OF COMPLETION

Work shall only begin after the contract is completely executed and the start work letter is received. It is anticipated that the start work letter shall be issued on or about October 17, 2017.

The Contractor shall review Specifications 01 29 76 Progress Payment Procedures and 01 77 00 Closeout Procedures and be completely familiar with the progress payment milestones and definitions related to construction closeout and contract closeout.

The Contractor shall have reached a level of Construction Closeout **NO LATER THAN Friday, November 30, 2018**. This milestone by definition of the specifications includes Owner Occupancy of all spaces.

SECTION 109.9 LIQUIDATED DAMAGES

The fixed, agreed upon, liquidated damages for failure to complete all work within the Contract Time, shall be calculated in accordance with Article 109 of Standard Specifications.

NON STANDARD BID ITEMS

BID ITEM 90001 – BASE BID

DESCRIPTION: The BASE BID shall include the complete installation of all building, mechanical, site, and utility components; the accepted testing, and commissioning of all systems; and the completion, and turn-in of all deliverables as outlined in the plans and specifications.

METHOD OF MEASUREMENT: The BASE BID shall be measured as Lump Sum of the required construction and installations described in the plans and specifications. Partial Payments shall be requested as indicated in Specifications 01 29 73-Schedule of Values and 01 29 76- Progress Payment Procedures.

BASIS OF PAYMENT: The BASE BID shall be paid at the contract unit price. Partial payments shall be reviewed and authorized as described in the above referenced specifications.

BID ITEM 90002 – ALTERNATE 1

DESCRIPTION: ALTERNATE NO. 1: Add crystalline concrete add mixture to the concrete mix for the structural decks.

METHOD OF MEASUREMENT: The ALTERNATE NO. 1 shall be measured as Lump Sum of the required construction and installations described in the plans and specifications. Partial Payments shall be requested as indicated in Specifications 01 29 73-Schedule of Values and 01 29 76-Progress Payment Procedures.

BASIS OF PAYMENT: The ALTERNATE NO. 1 shall be paid at the contract unit price. Partial payments shall be reviewed and authorized as described in the above referenced specifications.

POINTS OF CONTACT

We ask all Contractors with questions and concerns regarding the bidding documents shall contact the Project Architect by e-mail so we may properly log, track, and respond to all issues. Please reference Judge Doyle Garage (JDG) – City Contract #7952.

The Project Architect for this contract is:

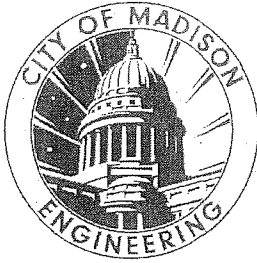
Lothan Van Hook Destefano Architecture
Mary Ann Van Hook, Managing Principal
PH: 312-765-7320
Email: mavanhook@lvdarchitecture.com

The Project Manager for the City Parking Utility for this contract is:

City of Madison
Sabrina Tolley, Project Manager
PH: 608-265-1147
Email: stolley@cityofmadison.com

The Construction Manager for City Engineering, Facilities Management for this contract is:

City of Madison
Dave Schaller, Construction Manager
PH: 608-243-5891
Email: dschaller@cityofmadison.com



Department of Public Works

Engineering Division

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

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Assistant City Engineer
Michael R. Dailey, P.E.

Principal Engineer 2
Gregory T. Fries, P.E.
Christopher J. Petykowski, P.E.

Principal Engineer 1
Christina M. Bachmann, P.E.
Eric L. Dundee, P.E.
John S. Fahrney, P.E.

Facilities & Sustainability
Jeanne E. Hoffman, Manager

Operations Manager
Kathleen M. Cryan

Mapping Section Manager
Eric T. Pederson, P.S.

Financial Manager
Steven B. Danner-Rivers

July 24, 2017

NOTICE OF ADDENDUM ADDENDUM NO. 1

CONTRACT NO. 7952 JUDGE DOYLE GARAGE

Revise and amend the contract document(s) for the above project as stated in this addendum, otherwise, the original document shall remain in effect.

Please acknowledge this addendum on page E1 of the contract documents and/or in Section E: Bidder's Acknowledgement on Bid Express.

Electronic version of these documents can be found on the Bid Express web site at:

<http://www.bidexpress.com>

If you are unable to download plan revisions associated with the addendum, please contact the Engineering office at 608-266-4751 receive the material by another route.

Sincerely,

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

Cc: Mike Dailey

ADDENDUM NO. 1
City of Madison, Engineering Department

CONTRACT NO. 7952
JUDGE DOYLE GARAGE

This addendum is issued to modify, explain or correct the original Drawings, Specifications, or Contract Documents of the subject contract and is hereby made a part of the contract documents.

A. GENERAL CONTRACT CONDITIONS –

- A. All permits must be obtained by the contractor and all City of Madison permit fees will be paid by the City.

B. GENERAL QUESTIONS AND ANSWERS –

Q1. Per the cities general conditions, item 107.4, the contractor is required to provide builders risk insurance for the project. On the Madison Municipal Building project the builders risk was carried by the city. Please confirm if the builders risk will be carried by the city similar to the MMB project or if the contract will be required to carry it.

A1. Per 107.4(i) whereas this is a new building, the builder's risk insurance is to be carried by the GC.

Q2. The following items/activities are shown to be part of the project but there appear to be no specifications provided. Please provide or direct bidder to where they can find them.

- a. Earth Retention System (ERS)
- b. Dewatering
- c. Site utilities (sanitary, water, storm, etc.)
- d. Excavation and Backfill
- e. Concrete Sidewalks and Asphalt Paving

A2. a. Earth Retention System (ERS) is the contractor's responsibility.

b. Dewatering is the contractor's responsibility.

c. Site utilities - as per the City of Madison specs

d. Excavation and Backfill located in Spec Section 312000.

e. Concrete sidewalks and asphalt paving - as per the City of Madison Standard Specifications for Public Works Construction.

Q3. Specification 04 22 00 – concrete unit masonry, item 2.3 calls for burnished CMU tells bidders to see the plans for what color burnished block to provide. The plans do not indicate what color to provide. Please provide.

A3. County Materials Corporation, Premier Ultra 63 - 218C, Sea Salt or approved equal

Material Schedule will be updated in Addendum 2

Q4. Specification 04 22 00 – concrete unit masonry, item 2.2.D calls for integral water repellent in CMU where indicated. The plans do not indicate where we are to supply the water repellent in the CMU. Please clarify.

A4. Supply the water repellent in above-grade exterior CMU walls.

Q5. The following questions are in regards to where burnish block is to be supplied.

a. Room U401 as shown on K3/A200.0 calls for burnished block. When referencing the room finish schedule the walls are called to be painted. This is typical for all rooms that have burnished block. Please modify the room finish schedule to denote rooms/walls that are to receive burnished block.

b. Vestibule rooms U301 and 101 on the South side of the building do not have burnished block called out in them while the other floors at this location do. Please clarify if they are to have burnished block as well.

c. Similar to the question above, vestibules U105 and U205 on the North side of the ramp have burnished block called out while all other floors at this location do not. Please confirm what floors are to receive burnished block at the North vestibule location.

d. Rooms U104 (Dry valve) and U106 (Elec) are called to have burnished block per D8/A-201.0.

With these two rooms being mechanical rooms please confirm that they are not required to have burnished block.

A5. Drawings will be coordinated and clarification will be provided in Addendum 2.

Q6. Vestibule U203 is called out to receive paint per the room finish schedule on sheet A501.0. The elevations of this room as shown on sheet A202.0 (J8 thru J12) call for the CMU to be stained. Please confirm what finish the walls are supposed to have. This question applied to all levels of the center vestibule.

A6. East & West Vestibule walls will be burnished block (Refer to 003) and receive a feature paint color for floor identification. Enlarged Core Plans & Elevations will be updated in Addendum 2. All concrete walls & soffits will be stained, except for feature walls (See Finish Plans on Sheets 501.0-501.6) CMU walls at the center cores will be painted, as per room finish schedule, to match concrete stain.

Q7. Sheet S401.0 has interior vehicle barrier wall reinforcing scheduled. Reviewing the plans, we cannot determine what walls are considered to be vehicle barrier walls. Please clarify what masonry walls are to be barrier walls.

A7. CMU vehicle barrier wall only occurs adjacent to motorcycle parking. Structural drawings include a design for the CMU wall below the windows at the elevator lobbies to be crash resistant, but may not be necessary in this location.

Q8. Per the masonry reinforcing schedule on S401.0 it gives an exterior wall at parking reinforcing but does not give an interior wall at parking. What wall reinforcing should we be using at the interior parking area walls.

A8. Interior parking area walls are per Partition Sheet A-501.0 and per "interior walls" on Sheet A-401.0. Walls are considered interior if no vehicle impact is required.

Q9. Detail 16 and 17/S202.0 give details for concrete curbs. The only reference we can find to concrete curbs is 3/A500.0. A type 3 masonry wall is just a part height wall vs wall type 1

which is a full height wall and they are often used in conjunction with each other (in the vestibules for example). Based on this it is not clear where we are to provide curbs. Please clarify

A9. Type 1 and 3 walls will be updated for clarity in Addendum 2.

Curbs should be provided beneath all CMU walls typical, 4" above local high point of slab, at a consistent elevation.

Q10. 3/A500.0 calls for a 4" high curb. In most places the slabs are sloping at the masonry wall locations. With the decks sloping and a constant height curb all the masonry will need to be cut at the first course. Please confirm if this is correct or should the top of the curbs be set at a constant elevation, allowing for a standardized coursing height for the masonry at the first course.

A10. See response to Q9.

Q11. Detail 1/A500.0 tells bidders to see notes 1, 12, 13 and 14. These notes do not appear to be provided. Please provide.

A11. Omit reference to notes 1, 12, 13 and 14.

Q12. Sheet A101.0 shows a masonry shaft next to the North elevator bank on level 1. This area is open to the floor below when referencing the floor below (A100.5) no masonry shaft is shown. Please confirm that the shaft shown on A101.0 is to extend down to the U0 slab.

A12. Masonry shaft starts at Level 2. Drawings will be updated to show this in Addendum 2

Q13. Sheet A100.5 at vestibule U005 the walls are called out to go full height. This would mean that the walls would need to go to the underside of level 2 since level 1 is open. When referencing the level 1 plan A101.0 these walls are not drawn in (same for the blow up detail). Please confirm that the walls are to go full height and if not please clarify how tall they are to be. Same would apply to Dry Valve room U004 near grid lines

A13. Correct, walls are full height

Q14. Sheet A101.0 shows a masonry shaft Near the north elevator bank. This area is open to below but the shaft not shown on the floor below. Please confirm if these walls are to extend down to the floor below or if they are "suspended" in the air. If they do not extend all the way to the slab below please clarify how we are to support the walls. If they do extend all the way down please clarify how we are to modify the vestibule for exiting since one of the doors would lead into this shaft

A14. See Q12

Q15. Similar to question 13, the walls of dry valve room U102 (sheet A100.4) are called out to go full height which would be to the underside of level 1 but they are not drawn in on sheet A100.5 (level U0) please confirm that they are to go full height and if not please clarify what elevation they are to go to.

A15. Correct, walls are full height

Q16. Sheet A104.0 shows masonry walls around a shaft on the North side of the building. There are no cut sections or indications on how tall to make these masonry walls. Please clarify

A16. Terminate masonry walls at the slab over hoist way. Walls above are Not In Contract.

Q17. Please confirm no drop plates are needed at columns along column lines 4 and 9 on Sheet S-100.3.

A17. Correct, no drop panels on grids 4 and 9.

Q18. Sheet S-100.5 shows the area wells but no footing parameters are provided. Please confirm that the continuous spread footing that is scaled 1'-6" x 1'-6" is correct per 8/S-204.0.

A18. Correct. Reinforcement will be added in Addendum 2.

Q19. Sheet A-210.0 has notes called out for a temporary roof on details K5 and K11 (sim for details on A-220.0). Based on these notes it is unclear as to the extent of the area that needs to have a temporary roof. Do we just supply temporary roofs at the stair shafts and elevator shafts or does it extend across the entire floor slab. Please clarify and provide a floor plan for the area(s) that need temporary roofing.

A19. Omit slab and temporary roof.

Q20. No specification is provided for the temporary roofing. Please provide.

A20. Omit temporary roof.

Q21. Detail 3/S-204.0 says to verify that the annex on the MMB building is supported on deep foundations. Based on our knowledge of the MMB project the annex does not have deep foundations as indicated on the detail. Please confirm how we are to modify this area to accommodate the shallow spread footings of the MMB annex addition.

A21. MMB is on shallow foundations. Will clarify in Addendum 2.

Q22. Detail K4/A-314.0 shows a masonry wall extending up from the perimeter wall (gridline A between approximate elevations of 913' and 924') is also shown on A-102.0 between gridlines 6 and 8. The slab above is not in contract, as noted on sheet S-103.0. Also the veneer at this location stops at the top of the concrete wall and doesn't extend up per A-303.0. Please confirm that we are not to include this wall.

A22. Wall above ramp slab in Not In Contract. Drawings will be updated in Addendum 2.

Q23. Sheet A-103.0 (level 3) shows masonry backup walls along gridline 12, gridline A, and gridline 1. Based on the cut sections on sheets A310.0 thru A315.0 masonry walls appear to terminate at the bottom side of 3rd floor (elevation 920'0"). Please confirm that the backup walls shown on sheet A-103.0 are not part of the contract with the one exception along gridline A between 11 and 12 which is necessary to provide the veneer as shown on A-303.0.

A23. Correct, backup walls terminate at the bottom side of 3rd floor.

Q24. Detail D12/A-202.0 says to take the aluminum framed openings to bottom of ceiling. No ceiling is detailed for this room. Please clarify what type of ceiling to provide and at what elevation.

A24. At vestibules with no ceiling, windows typically extend to the bottom of slab above. Vestibule U005 requires a ceiling. Windows in this location to extend to top of ceiling. Elevations and window head dimensions will be added to drawings in Addendum 2.

Q25. Details K6 and K10 on A-202.1 show reflected ceilings but do not indicate what elevation they are at. Please clarify.

A25. Ceiling elevations will be added to reflected ceiling plans in Addendum 2.

Q26. At detail 8 on drawing A-500.0 a note states "12" x 18" TREATED WOOD BLOCKING FOR SIGNAGE POSTING— BY OWNER". JP Cullen understands that note to mean the wood blocking is by Owner. Please confirm this is the intent.

A26. Wood blocking not provided by Owner. Provide 1x preservative treated lumber.

Q27. Sheet S-101.0, row E and E.6 and Column lines 6 and 7, call for a drop panel of 10x8. On column line 6 states a 6" drop panel typical. Please confirm both of these drop panels are to be 8".

A27. Correct, 8". Will clarify in Addendum 2.

Q28. Sheet S-101.0 at the intersection of column lines E.6 and 8 it states there is a 24x48 column below. Per the column schedule and this column is called out to be 18x38. Please confirm the size of the column that is to be provided at this location.

A28. 18x38 per column schedule. Will clarify in Addendum 2.

Q29. Sheet S-101.0, near the intersection of B and 5, please provide a cut section or indicate what is occurring between the column and Elevator shaft wall.

A29. Concrete wall on grid 5 below extends to underside of level 1 slab. Slab step occurs where slab ramps downward north of grid 5. Will clarify in Addendum 2.

Q30. Sheet S-104.0, there are many items that are not hatched out (up turned beams along grid lines 1 and 12 for example. It is our understanding that everything on this floor is by the subsequent project and is not to be included with the exception of the small structural slab on the South end. Please confirm that the walls, columns, and beams that are not hatched out are to be excluded.

A30. Only items included are between grids 11-12 and B-C. Will clarify in Addendum 2.

Q31. Sheet S-104.0, at column lines 11 and 12, there are beam sizes being called out but don't have a beam tag. Please provide so we can determine what reinforcing is required.

A31. Will provide beam reinforcement in Addendum 2.

Q32. Sheet S-100.5, columns E-3 and E-4 are called out on the schedule as 18x38 but on the floor plan they scale to 24x48. Please confirm the dimensions.

A32. 18x38 per schedule.

Q33. Sheet S-100.5, column E-2 is called out on the schedule as 24x36 but the plan scales out to be 32x60. Please confirm the size.

A33. See 7/S-313 & Column R1.3-2 per S-301.4. 30'x60" per schedule from U0 slab to level 1.

Q34. Sheet A-303.0 Shows the concrete wall stepping along this elevation. On Sheet S-102.0 and on detail 1/S-205.0 no brick ledge is indicated or shown, please provide detail on how we

are to accomplish the stepping of the wall for the stone veneer, including elevations and brick ledge details.

A34. Only the stone veneer steps. There is no ledge in this location. See D2/A-400.0 for similar detail.

Q35. Per the column schedule and sheets S-101.0 and S-102.0, columns D-1, D-2, D-3, D-8, R1.3-2, R1.3-3, and E(-2'10 ½)-12 are indicated to be included in this work package while the other columns in this area that extend to the bottom of the deck above (provided by the next project) are not. Please confirm if this is correct or should all the columns be excluded or included in the area between column lines 1 and 8 from D to R1.3.

A35. Columns noted are included in contract up to underside of level 1 only. Will clarify in Addendum 2.

Q36. Sheet A-100.5 has 10" CMU walls scheduled (electrical vault and water service fire pump rooms). Referring to the masonry reinforcing schedule on sheet S-401.0 there is no reinforcing call out for 10 inch CMU. Please clarify what reinforcing we are to provide at the 10 inch walls.

A36. Use same reinforcement as the 8" walls.

Q37. Sheet A-101.0 shows what appears to be a partial height wall that curves (adjacent to the emergency generator room). There is no tag or cut section to denote what this wall is. Please provide more information.

A37. This is a concrete curb/apron. Detail will be provided on drawings in Addendum 2.

Q38. On K3/A-400.0, Detail K4/A-451.0 is called out but K4 is not on sheet A-451.0. Please provide detail.

A38. See K6/A-451.2

Q39. On K6/A-401.0, Detail F3/A-451.1 is called out but F3 is not on sheet A-451.1. Please provide detail.

A39. See E4/A-451.1

Q40. On K6/A-402.0, Detail K3/A-451.1 is called out but K3 is not on sheet A-451.1. Please provide detail.

A40. See K4/A-451.1

Q41. On K3/A-402.0, Detail F11/A-451.2 is called out but F11 is not on sheet A-451.2. Please provide detail.

A41. See E11/A-451.2

Q42. Sheet S-100.1, general note 1 states the slab on grade need to be a minimum of 6". Between column line 6 and 7 and row A.3 and B states to provide a 6" structural slab on grade. At the same column lines but row C and D calls for the slab on grade to be 8". Please confirm the 8" concrete slab on grade note is supposed to be 6" or define the extents of the 8" slab on grade.

A42. Slab on grade is 6" on all of level U4. Will clarify on Addendum 2.

Q43. Section cuts on sheets A-210.0 and A-220.0 show what appear to be concrete slabs extending over the shaft openings for the stairs and elevators. Per the structural drawings the center cores do not call for concrete slabs over the shaft openings (grid lines 9 and 4). Please confirm that these shafts are to remain open and are not capped with structural slabs.

A43. These slabs and temporary roofs to be deleted in Addendum 2.

Q44. At detail 1 on S-501.0 there is a steel beam called out at the upper beam connection that supports a composite steel deck slab. Where this detail occurs the slabs are structural concrete (not composite steel deck). Please revise the detail to show how we are to connect to the concrete structural slabs.

A44. The detail represents all possible conditions. See lower connection for concrete slab connection information.

Q45. On drawing S-101.0 along column line 1, between column lines A & B there is a note to see detail J9/A-411.1 for a WF beam. The J9 detail does not identify the beam size. Please review and clarify the steel detail.

A45. To be provided in Addendum 2.

Q46. On drawing S-101.0 at the intersection of column lines 1-C there is a note about a steel lintel welded to a steel embed plate, no size is given. Please clarify the lintel size.

A46. To be provided in Addendum 2.

Q47. Detail J2/A-414.1 shows a steel lintel at the overhead door openings. This steel lintel is not shown or called out on the structural drawings and there is no table for steel lintels this long. Please indicate what size steel lintel we are to provide.

A47. To be provided in Addendum 2.

Q48. Sheet A-101.0, the masonry wall that cuts across corridor 0104 at 0104A is shown to be partial height per cut section K7/A411.2. Per code plan E1 on G-103.0 this wall is called out to be 2 hour rated. Please clarify how we are to create this fire separation with the wall when it only goes partial height.

A48. Delete steel beam and extend wall to bottom of slab above. Detail to be provided in Addendum 2.

Q49. I'm having a hard time finding a structural detail that shows how the elevators shaft walls, stairwell walls, and shear walls tie into the structural slabs. It makes a big difference for us if we can gang form the shafts and pour multiple levels at a time or if we'll have to pour them floor by floor. Please provide a detail for that connection.

A49. Design assumption is floor to floor construction similar to detail 5/S-310.0. Will clarify in Addendum 2.

Q50. Also looking for a detail as to how the ramp wall along column line D.5 ties into the ramp. Again, I'm having a hard time finding a typical detail for that. It appears the wall extends from U4-U0, but not a lot is shown for connections at each level.

A50. Design assumption is floor to floor construction similar to detail 5/S-310.0. Will clarify in Addendum 2.

Q51. Has there been any conversation as to extending the project schedule? Preliminary talks with excavators seem to indicate the utility work and main building excavation & retention could take close to 4 months. This is a unique project in regards to the depth below grade and tight site constraints. That only leaves five us 9 months to do the below and above grade work, including extensive waterproofing, which will also be through the dead of winter. It seems like a very tight schedule.

A51. Will be included with in Addendum 2.

Q52. Please confirm that the SOG for level U4 is a 6" structural slab between gridlines A and B.5 and that the remaining areas are and 8" fiber reinforced slab.

A52. All of level U4 slab on grade is 6" thick with fiber reinforcement. Will clarify in Addendum 2.

Q53. On Sheet A-100.1 the full height chain linked fence and chain link gates are shown on the drawings along grid line 6. No specification is provided for the chain link fence. Please provide.

A53. Specification will be issued in Addendum 2.

Q54. Sheet A-502, on the door schedule there are a number of openings with hollow metal doors where there is no frame material type given. Please confirm these are to be hollow metal. An example is door U001

A54. All door frames are hollow metal except 0200, and 0200A. All hollow metal frames to be painted.

Q55. On drawing A-201.0 rooms U206 and U210 call for WP-1 wall finish however this finish is not called out on the room finish schedule (A-501.0). The room finish schedule calls for GPY/PT-1. Please confirm which wall finish is required.

A55. See Partition Type 9 - Prefinished Plastic Panels.

Q56. The room finish schedule on drawing A-501.0 calls for CL-1 ceiling finish in many areas. Ceiling type CL-1 is blank on the finish legend. Please clarify what CL-1 is.

A56. CL-1 is exposed construction to receive ST-1 at exposed concrete and PT-1 at all other exposed surfaces. Material Legend and Room Finish Schedule updated for clarification.

Q57. Spec section 05 50 00 calls for a knox box under part 2.16.A. Please identify the location of the box on the drawings and provide model #.

A57. Delete Knox box spec section.

Q58. Detail 6/PA-701.0 shows surface mounted pipe bollard, bolted to the concrete curb. Spec 05 50 00 part 3.4.B describes bollards with concrete footings. Please clarify what type of bollard we are to provide.

A58. Follow Architectural detail.

Q59. Please size the steel called out at details D2 & F2 on A-412.2. and provide the method of attachment to the structure. These angles are not addressed on the structural drawings. Similar would apply to F4 and H2 on A-415.0

A59. To be designed as required by curtain wall metal fabrication & louvers. See Specifications 05500, 084423, and 089119.

Q60. At detail 8 on M-500 shows an insulated metal curb that is called out to be by GC. Please provide a specification for the curb so bidders know what to provide.

A60. To be provided in Addendum 2.

Q61. Regarding louvers, there is conflicting information on the mechanical drawings as to who provides this work. M-101.0 & M-101.2 for example call for exhaust louvers by MC; however, detail 13/M-500.0 calls for louvers by GC. Please confirm who is to provide and install the louvers and related flashing.

A61. To be determined by General Contractor.

Q62. The louvers at Doty Street called out on drawing A-302.0 do not appear to be called out on the mechanical drawings (For the similar situation on Wilson street the louvers are called out on the mechanical drawings). Please confirm who is to provide the louvers.

A62. To be determined by General Contractor.

Q63. Detail G2/A-411.3 calls limestone panels out to be 1-1/2" thick. Specification section 044200 page 3 item 2.3.H states that stone to be not less than 2" thick. Please clarify how thick the limestone panels are to be.

A63. Limestone panels to be 1-1/2" thick.

Q64. Cut section J2/A-414.1 does not show any lime stone veneer on it. On detail k4/A-414.0 the walls that abut the opening where the J2 section is cut do indicate stone. Please clarify if we are to provide stone over the opening.

A64. No stone over the opening to the ramps. Stone at the jambs of the openings should extend to bottom of slab above.

Q65. Cut Section K2/A-401 has a note for stained concrete and CMU that points to the return wall on column line A.3. Per K4/A-414.0 the return is drawn as if it is to receive stone veneer. Please confirm that we are to provide limestone veneer as indicated on detail K4/A-414.0

A65. Provide limestone veneer as indicated on detail K4/A-414.0

Q66. Detail G2/A411.3 shows the typical stone joint detail. Please answer the following questions.

a. There is a note for using a proprietary stone anchor. Per the specification this anchor type is not given. Please clarify the manufacturer and anchor type.

b. No caulking or mortar is shown in the joint between the stone panels. Please confirm that we are to leave open joints or clarify what type of material we are to fill the joint with.

A66. a. Proprietary stone anchor to be Halfen Body Anchor or approved equal. Strap Anchors acceptable.

B. Leave joint between stone panels open.

Q67. The architectural drawings do not indicate any waterproofing for interior column footings. Per detail G9/A-451.0 and similar, waterproofing is shown to be placed under the

footings at the exterior wall conditions. Please clarify if we are to waterproof the bottom of all interior column footings in a similar manner.

A67. Yes. Provide waterproofing under all interior column footings. The intent is to provide a complete moisture resistant envelope.

Q68. Plan Sheet S-100.4 is noted on the Document Set Index and is omitted from the electronic plan set. Please provide if it is required.

A68. Clarification to be provided in Addendum 2.

Q69. There is a note "Concrete Slab on Grade 8" between Col. 7 & 8 and C & D with what would appear to be a contradictory note of 6" Structural slab Between Col. 7 & 8 and A.3 & B along with Notes #1. Which is accurate?

A69. All of level U4 slab on grade is 6" thick. Will clarify in Addenda 2.

Q70. Sheet S-001.0. Under - General Excavation Notes, #9, notes 3" Mud Slab while on; Foundation Notes, #3, notes 4" Mud Slab. Please confirm which is correct.

A70. 4" is correct. Will clarify in Addenda 2.

Q71. Sheet S-201.0 Please provide the width of RF2

A71. 2'-0". Will clarify in Addenda 2.

Q72. Sheet S-204.0 There is a note "Concrete Slab on Grade 8" between Col. 7 & 8 and C & D with what would appear to be a contradictory note of 6" Structural slab Between Col. 7 & 8 and A.3 & B along with Notes #1. Which is accurate?

A72. All of level U4 slab on grade is 6" thick. Will clarify in Addenda 2.

Q73. Is the earth retention system temporary or permanent? The drawings indicate a 1 sided wall pour against the earth retention. The Geotech report discusses this scenario as option B and describes this scenario, but it also calls for the temporary earth retention to be designed for "at rest pressures". General Excavation Note #2 on S-001.0 direct use to design the earth retention system in accordance with parameters established in the Geotechnical Report. It is our opinion that designing an earth retention system for at rest pressures is designing for a permanent wall, not a temporary wall. At rest pressures are 30-40% higher than active pressures and will result in a more costly earth retention system than what is required for a temporary earth retention system in our opinion. Please indicate if this is meant to be a temporary or permanent shoring system. If it is temporary, it is our opinion that at rest pressures should not be used for basis of design. Please supply at rest pressures from the Geotechnical Consultant.

A73. All ERS design to be by the Contractor in consultation with the Geotechnical consultant.

Q74. What lateral pressure has been used for design of the permanent wall? Does it include hydrostatic pressure?

A74. All ERS design to be by the Contractor in consultation with the Geotechnical consultant.

Q75. What is the design groundwater elevation for the temporary shoring walls and permanent 16" walls?

A75. All ERS design to be by the Contractor in consultation with the Geotechnical consultant.

Q76. What is the estimated volume of seepage into excavation?

A76. All ERS design to be by the Contractor in consultation with the Geotechnical consultant.

Q77. Are soil samples from the geotechnical investigation available for observation?

A77. All ERS design to be by the Contractor in consultation with the Geotechnical consultant.

Q78. Who will review the earth retention design submittal?

A78. ERS design will be reviewed by the architect and structural engineer for information only.

Q79. Have soil movement tolerances been established? If so, provide. General Excavation Note #5 on sheet S-001.0 discusses the monitoring required, but does not establish a threshold of movement for the shoring wall.

A79. All ERS design is to be part of the contract. The ERS contractor is to work in consultation with the Geotechnical consultant, so as to not cause any negative effect to adjacent buildings, , structures, curbs, utilities, etc.

Q80. Detail 3 on S-204.0 implies that the Madison Municipal Building (MMB) Annex is supported on piles and needs to be field verified. Are we to assume that the MMB Annex is supported on piling for the bid? Is the MMB Building supported on piles?

A80. MMB is supported on shallow foundations. Will clarify in Addendum 2.

Q81. We are requesting as-built drawings and building loads for the Madison Municipal Building (MMB) and the East Parking Garage.

A81. Will be included with in Addendum 2.

Q82. The geotechnical report refers to potentially contaminated materials on the site. Please clarify how payment for removing contaminated or hazardous materials from the site will be paid. Please clarify how much material is anticipated to be contaminated and the environmental contaminates to be assumed for bidding purposes.

A82. The amount of possible contaminated soil is unknown. The City will handle the testing, landfill profiling, and the landfill tipping fee. The contractor should be prepared that if contamination is discovered, a delay of 1 to 2 weeks should be expected prior to being able to haul.

Q83. The geotechnical report refers to existence of an environmental report. Please provide the report.

A83. Will be included with in Addendum 2.

Q84. Specification 04 22 00 - concrete masonry item 2.7.A specifies single-wythe CMU flashing and it is specified to be installed were indicated (3.7.A). In reviewing the plans there appears to be no single wythe flashing indicated. Please confirm that there is no single wythe flashing required or clarify where we are to provide.

A84. Confirmed. No single wythe flashing required.

Q85. Specification 04 42 00 - exterior stone cladding, page 4 talks about fabrication of steel stud frames, and painting of them under items 2.7 and 2.8. Please clarify where this applies. Also this work should be covered under the drywall framing and painting specifications so if it does apply please move it to the respective divisions so subcontractors do not miss it.

A85. This is not applicable. Delete items 2.7 and 2.8

Q86. Specification 04 22 00 - Concrete Unit Masonry calls for 5'x4' mockup of the stone panels and burnished block. Specification 04 42 00 - exterior stone cladding calls for a 15'x10' mockup of the exterior wall. Please clarify what size mockup of the exterior stone cladding is required. If we are required to provide a 15'x10' mockup is it acceptable to incorporate it into the building as a finished product. If not please indicate where we are to place it on site and provide a drawing of what we are to provide, including the structural components to support it.

A86. Stone mockup to be constructed approximately 7' W x 4' H, extent per G6/A-411.3, with CMU and all components of wall assembly. Approved mockups may remain as part of the finished work per 04 42 00, E.3.

Q87. Specification 04 22 00 - Concrete Unit Masonry item 2.8.D calls for a PTA 420 anchor that mechanically fastens to the structure. Per detail 2/S-401.0 we are to use a PTA310 that goes into a dovetail slot. Please clarify what system we are to use or indicate if it is contractor's choice.

A87. Either is acceptable.

Q88. Page A-002.0 shows a new fire hydrant on East Wilson at the A Column line, but there is no mention of it on the C-141.0 Site Utility Plan. Please clarify if this hydrant is to be included.

A88. Only hydrants shown on C-141.0 are required.

Q89. Page L-101 shows existing hydrant at East Wilson Street at the E column line. However the C-141.0 calls for the removal of this, with no new hydrant. Please clarify if this hydrant is to remain, to be removed, or temporarily removed during construction and replaced.

A89. Only hydrants shown on C-141.0 are required.

Q90. On Page C-110.0 there are approximately 20 parking meters shown that will need to be removed in the parking lot and along Pinckney Street and Wilson, but no mention is made of that. Please clarify if the general contractor is responsible for the removal of these meters.

A90. This question appears to reference sheet C-111.0 in lieu of C-110.0 as C-110.0 is not part of the plan set. Sheet C-110.0 will be revised in Addendum 2 to show that the contractor is responsible for calling Dan Valenza at the City Parking utility 608-266-4744 to have Parking Utility crews remove the parking meter heads, space markers, and pay station. The contractor shall give at least two business days notice before the meters need to be removed. The contractor is required to remove and dispose of the parking meter posts and bases once that Parking Utility has removed the meter heads and space markers.

Q91. Detail 3/S-204.0 Calls out "drainage board at exterior face of ERS wall" as a dashed line starting at approximately elevation of 871' and extending well below the bottom of footing. Please clarify at what elevation the bottom of the drainage board stops at.

A91. Drainage board shall be located full height at outside face of all ERS walls. Will clarify in Addenda 2.

Q92. Section 104.2 "intent and coordination of contract documents" lists: Exhibit D - Geotechnical Report Dated 6/3/27 as an "exhibit for bidding purposes." Boring 1 noted a possible petroleum odor near 50 ft. Please clarify if these soils, if contaminated, will be considered an unforeseen condition and paid for as change order or specify an allowance that should be included in the bid for the removal and proper disposal of contaminated soils.

A92. Please see answer to Q82.

Q93. Spec Section 31 20 00-2 (1.7)B states: Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of contract. Detail 3/S-204.0 calls out "Open Cut - Excavation, as determined by contractor." This open cut extends past the property line onto the adjoining property. Please clarify if earth moving operations for the Judge Doyle Parking Structure on the MMB property have been authorized.

A93. Please see specification revisions as part of this Addendum 1. Addendum 2 sheets will delete the call out of open cut excavation and identify the west project limit as the property line. ERS will be required to maintain the property line project limit.

Q94. Per structural concrete note part D.1 on Sheet S-001.0 it states that all pours to have a maximum pour size of 90' in either direction. At a 90' pour requirement the decks will need to be poured in at least 6 pours per floor but if we can go larger they could be poured in as little as 4 pours per floor, which would be more efficient. Please clarify if this maximum pour size of 90' can be deviated from for the structural slabs.

A94. 130' pour size could be used. Will clarify in Addenda 2.

Q95. Wall section K7/A-400.0 shows the first floor retail space is part of our contract. Floor plans on the first floor for both the architectural and structural indicate this is not part of our contract. Please confirm this is not part of our contract.

A95. Confirmed. Retail space is Not In Contract.

Q96. Wall sections K6 & K2/A-401.0 are on the same level but the two blow up details for C4 and H11/A-451.1 have different water stop conditions. Please clarify the extent of the second strip of waterstop needed at the Doty street entrance.

A96. It is our intent to have two water stops at both entrances along entire length of both garage openings. Detail will be updated for Addendum 2.

Q97. Please provide detail H3/A-451.1 as called out on K6/A-402.0

A97. This detail currently does not exist. However detail G4/A-451.1 is the one that was meant to be tagged (instead of H3/A-451.1) on section K6/A-402 at the grade condition (above sidewalk vault at Wilson St) opposite detail H7/A-451.1.

Q98. Please provide detail C11/A-451.2 as called out on K3/A-402.0

A98. Detail is already provided on sheet A-451.2 in upper left corner.

Q99. General note 4 on drawing C-121.0 calls for pavement damage to be patched per the City's patching criteria. I contacted the engineering department and was told that Wilson Street could have a temporary patch for the utility work since the street is scheduled for future work under a separate contract. Please confirm if temp patching is acceptable or if the patching criteria should be followed.

A99. Doty and Wilson are schedule for future public works reconstruction. All street patching will require the contractor to match existing materials and thicknesses for all street patching.

Q100. Erosion control note 5 on drawing C-121.0 addresses applications that have been submitted. Have the fees for these applications been paid or is the General Contractor to include these fees?

A100. Fees for the City erosion control permit & WDNR WRAPP will be paid by the City. Please see specification revisions as part of this Addendum 1.

Q101. With the Madison Municipal Building bid, the Street Occupancy and meter fees were waived on Wilson Street. This does not appear to be the case for this project based on review of the bid documents. Is that correct, should the contractor be including all fees as stated in Section 108.2, part D Special Provision of the contract specifications?

A101. Please see specification revisions as part of this Addendum 1.

Q102. Video Surveillance System - In Section 2.1 it says the video surveillance system shall be an expansion of the existing video management system. It is our understanding this is a completely new independent system/build. Do we need to provide a new Exacq Vision Server for recording the new cameras? If we do need to provide a new Exacq Vision Server please specify the series and size of the Exacq vision server or servers.

A102. The camera system will be an expansion to the existing City ExacQ enterprise system. Parking Utility already utilizes this system. No backend server required. Cameras and licenses still required.

Q103. Section 27 00 00 - Please confirm that there is no voice and data cabling in the scope of this work, other than related to the camera work?

A103. There are data locations for the pay stations/kiosks as well as the parking office as noted on the plans

Q104. Section 27 21 33 - This spec says WAPs are to be installed in the parking garage. Please confirm that there are no WAPs on this project.

A104. City IT has no requirement for WAPs, however, this could be something that the Parking Utility is interested in having throughout the structure. This would be a question for the parking utility. In general, IT recommends a WAP in any office area (if needed) as well as any HVAC or utility area if monitoring/testing equipment is to be used for maintenance.

Q105. In spec section 10 14 there is a reference to variable message sign such as from Daktronics, but it is not indicated in the drawings. Other than the 5 floor plans, is there a sign schedule that shows quantity by sign type? Signage quantity can't be calculated from PA-601.0, PA-701.A and G-101.0

A105. All "fixed" signage (both electronic & non-electronic) should be provided and installed by the contractor, except for the motorcycle space markers (Detail S38), which our sign shop will make to provide for contractor installation.

The dynamic signage will be owner supplied and installed by HUB in coordination with the PARCS installation. The electrical contractor will need to assist with connections & all conduit and wire needs to be installed by the contractor. HUB will essentially be hanging, connecting, and configuring the electronic signage. This applies to sign details S24, S26, S27.

Entrance/Exit signage will be added to drawings in future Addendum. Mechanical should be coordinated with HUB.

Q106. Section 108.2 of the Section D: Special Provisions states " The Contractor shall apply, pay for, and obtain all permits...." Is Dave Schaller the point guy regarding all City of Madison fees or do we need to contact each respective department?

A106. City Construction Manager Dave Schaller is the point person to contact regarding the coordination of payment for all City of Madison permit and licensing fees. Please see specification revisions as part of this Addendum 1.

Q107. Please confirm if there will be street degradation fees. City of Madison Building Inspection (Alan Harper) sent information that the building permit fee is based on \$0.12/SF for a ramp structure. Will a street occupancy permit be required? Other fees?

A107. There will not be any City of Madison street degradation fees, City of Madison permit fees, City of Madison street occupancy fees, or City of Madison licensing fees. Please see specification revisions as part of this Addendum 1.

Q108. Looking at the plan room of CD Smith webpage, sign schedules only appear on the following sheets:

G-101.0

PA-601.0

PA-701.0

Is that it? Do you have a list of the plan holders to send a signage package to?

A108. Parking sign locations are shown on the floor plans on drawings:

PA-100.1, PA-100.2, PA-100.3, PA-100.4, PA-100.5, PA-101.0, PA-102.0

The parking sign schedule and components are shown on drawing PA-601.0

The parking sign mounting details are shown on drawing PA-701.0

The parking signage spec section is Section 10 14 00

The plan holders list is available on the Bid Express website. The current plan holders list has C.D. Smith, C.G. Schmidt, J.H. Findorff, J.P. Cullen, Miron, and Stevens. Other possible bidders include Kraemer Bros., Tri-North, Vogel, and Boldt.

Q109. The project being bid on August 4 is just for the City of Madison Parking Garage, correct? So only testing for the garage is included in this bid? Is it correct to assume that the testing for the structure above is being handled separately through Beitler directly?

A109. Yes.

Q110. Section 01 45 29 - Test Laboratory Services indicates that four sections require testing:

03 30 00 - Cast-In-Place Concrete

05 12 00 - Structural Steel Framing

05 40 00 - Cold-formed metal framing

31 20 00 - Earthwork

Specs are provided in project manuals for 03 30 00 and 31 20 00, but there are no specs listed for 05 12 00 and 05 40 00, but there is a spec for 05 50 00 (Metal Fabrications). Can you confirm if structural steel framing and cold-formed metal framing testing is required or not?

A110. There is not any structural steel or cold formed framing in this project and the miscellaneous metals (05 50 00) will not require any testing.

Q111. b. In 01 45 29, page 2, Section 1.7, Subsection A, Items 1 through 4 (testing for cast-in-place concrete). These four items appear to describe the verifying the contractor's concrete mix designs.

a. These items are usually handled on the concrete supplier's mix design schedule.

b. Is the expectation that an independent testing lab complete this testing for the project?

A111. a. Agreed. These submittals generally include documentation on the cement, admixtures, mix proportions, as well as concrete test break history.

b. No.

Q112. In 01 45 29, page 2, Section 1.7 (cast-in-place concrete testing) there is mention of the typical field tests (slump, temperature, and percent air entrainment), as well as cast of test cylinders. No questions with that. However, in Section 03 30 00, Pages 17-18 in addition to the concrete field tests and compressive strength cylinders, there is also mention of steel reinforcement placement inspection (rebar checking) being required. Can you confirm if rebar inspection is required, or just concrete testing?

A112. Include rebar placement inspection.

C. ACCEPTABLE EQUIVALENTS – No change for ADDENDUM No. 1.

D. SPECIFICATIONS

A. Section 108.2, part D Special Provision of the contract specifications. DELETE all reference to the contractor paying for City of Madison permit and application fees. ADD that the City will pay all City of Madison permit and application fees. NOTE: The contractor will still be required to apply and obtain all permits and licenses required and the contractor shall still be responsible for any fines issued due to non-compliance with the project permits.

B. Spec Section 31 20 00-2 (1.7)(B) - DELETE

C. Spec Section 31 20 00-2 (1.7)(B) – ADD – The west property line will be the west project limit. Earth Retention System (ERS) will be required to protect the property west of the property line.

D. Spec Section 31 20 00-2 (1.7)(B)(1) DELETE

E. Spec Section 31 20 00-2 (1.7)(B)(1) ADD – Contractor to include support for the MMB annex addition structure in the design of the ERS for this project.

E. DRAWINGS – No change for ADDENDUM No. 1

F. ADD ALTERNATES

A. Crystalline add mixture in the concrete mix design for the structural decks should be

included as an Add Alternate to the bid. See Addendum 2 for the updated concrete mixtures.

G. CLARIFICATIONS

- A. 111200 Parking Control Equipment - All parking control equipment conduit, wire and final electrical connections to be by the Electrical Contractor as part of this contract. All Parking control equipment to be installed by HUB Parking Technology.
- B. Electronic Signage to be installed by City Parking Utility and wired by the Electrical Contractor.
- C. Please see revised contract language - City Contract Page D-1, ARTICLE 102.9 - DELETE the last paragraph and ADD the following: "When a bidder is unable to achieve the established SBE goal, the bidder must demonstrate that a good faith effort to do so was made. In addition to those criteria set forth in Section 2.4.1 of Section C, a union General Contractor wishing to subcontract with a non-union Small Business Enterprise (SBE), who's scope of work is included in the jurisdiction of a union that the union general contractor is signatory to, may encourage the non-union SBE subcontractor to consider entering into a Project Labor Agreement with the subject union specific to the project. The City will consider this when determining if a good faith effort was made. Interested SBE Subcontractors may contact the Executive Director, Building and Construction Trades Council of South Central Wisconsin at btrades@sbcglobal.net or at (608) 256-3161 to discuss entering into such an agreement."

Please acknowledge this addendum on page E1 of the contract documents and/or in Section E: Bidder's Acknowledgement on Bid Express.

Electronic version of these documents can be found on Bid Express at <https://www.bidexpress.com/>

If you are unable to download plan revisions associated with the addendum, please contact the Engineering office at 608-266-4751 to receive the material by another method.

For questions regarding this bid, contact:

David Schaller
City of Madison Engineering (Facilities)
Construction Manager
Phone: (608) 243-5891
Email: dschaller@cityofmadison.com



Department of Public Works
Engineering Division

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Assistant City Engineer

Michael R. Dailey, P.E.

Principal Engineer 2

Gregory T. Fries, P.E.
Christopher J. Petykowski, P.E.

Principal Engineer 1

Christina M. Bachmann, P.E.
Eric L. Dundee, P.E.
John S. Fahmey, P.E.

Facilities & Sustainability

Jeanne E. Hoffman, Manager

Operations Manager

Kathleen M. Cryan

Mapping Section Manager

Eric T. Pederson, P.S.

Financial Manager

Steven B. Danner-Rivers

July 28, 2017

**NOTICE OF ADDENDUM
ADDENDUM NO. 2**

**CONTRACT NO. 7952
JUDGE DOYLE GARAGE
CITY OF MADISON
WISCONSIN**

Revise and amend the contract document(s) for the above project as stated in this addendum, otherwise, the original document shall remain in effect.

Please acknowledge this addendum on page E1 of the contract documents and/or in Section E: Bidder's Acknowledgement on Bid Express.

Electronic version of these documents can be found on the Bid Express web site at:

<http://www.bidexpress.com>

If you are unable to download plan revisions associated with the addendum, please contact the Engineering office at 608-266-4751 receive the material by another route.

Sincerely,

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

Cc: Greg Fries

ADDENDUM NO. 2
City of Madison, Engineering Department

CONTRACT NO. 7952
JUDGE DOYLE GARAGE

This addendum is issued to modify, explain or correct the original Drawings, Specifications, or Contract Documents of the subject contract and is hereby made a part of the contract documents.

CIVIL

SPECIFICATION ITEMS

None

DRAWING ITEMS

Drawing C-111:

Added cross out symbols to trees the need to be removed. Added "trees, shrubs" to note 2.
Added note 5: "Contractor shall remove 20 parking meters that are located within the parking lot & along Pinckney & Wilson Streets. Contractor shall coordinate these removals with city parking utility."

Drawing C-121.0:

Added note to refer to sheet R100 for vault grate detail.

Drawing C-141.0:

Added notes to storm sewer along Wilson to better define the amount of work included in the project.
Added notes to match water utility plan (R102).

ATTACHED DRAWINGS (FULL SIZE):

C-111.0

C-121.0

C-141.0

ATTACHED SPECIFICATIONS:

None.

LANDSCAPE

SPECIFICATION ITEMS

Section 32 91 13 - Soil Preparation:

Article 3.3- Field Quality Control, Paragraph A: DELETE word "Owner" and ADD word "Contractor"

DRAWING ITEMS

None.

ATTACHED DRAWINGS (FULL SIZE):

None.

ATTACHED SPECIFICATIONS:

32 91 13

ARCHITECTURAL

SPECIFICATION ITEMS

Section 00 00 05 - Table of Contents: Refer to attached section.

Added Section 01 23 00 – Alternates.
Added Section 05 40 00 - Cold-Formed Metal Framing.
Added Section 06 16 00 – Sheathing.
Added Section 08 36 13 - Sectional Doors.
Added Section 08 42 29 - Sliding Automatic Entrances.
Deleted Section 08 3323 - Overhead Coiling Doors.
Deleted Section 27 32 43 - Radio Communications Equipment
Added Section 27 0000 - General Communications Requirements
Added Section 27 0526 - Grounding and Bonding for Communications Systems
Added Section 27 0528.29 - Hangers and Supports for Communications Systems
Added Section 27 0528.33 - Raceway and Boxes for Communications Systems
Added Section 27 0553 - Communications Systems Identification
Added Section 27 1000 - Structured Cabling
Added Section 27 1100 - Communications Equipment Room Fittings
Added Section 27 1500 - Communications Horizontal Cabling
Added Section 27 5129 - Emergency Communication System
Added Section 27 5319 - Emergency Responder Radio Coverage System

Section 01 23 00 – Alternates:

Section issued for information contained in Addendum #1. Refer to attached section.
Section revised to add Alternates S-1. Refer to attached section.

Section 04 22 00 – Concrete Unit Masonry:

Section issued for information contained in Addendum #1. Refer to attached section.
Special tests and inspection shall be provided by Contractor. Refer to attached section.

Section 04 42 00 – Exterior Stone Cladding:

Section issued for information contained in Addendum #1. Refer to attached section.

Section 05 40 00 - Cold-Formed Metal Framing:

Section issued for exterior wall framing as required by the drawings.

Section 05 50 00 – Metal fabrications:

Section issued for information contained in Addendum #1. Refer to attached section.
Delete Fire Department Lock Box. Refer to attached section.

Section 06 16 00 – Sheathing:

Section issued for exterior wall construction as required by the Drawings.

Section 07 13 26 – Blindside Self-Adhering Sheet Waterproofing:

Section revised to add language to have the Contractor employ a third-party independent observer (TPIO). Refer to attached section.

Section 07 13 52- Modified Bituminous Sheet Waterproofing:

Section revised to add language to have the Contractor employ a third-party independent observer (TPIO). Refer to attached section.

Section 07 18 16 - Vehicular Traffic Coatings:

DELETE entire section. Vehicular traffic coating will not be included in this project.

Section 07 84 13 - Penetration Firestopping:

Tests and inspection shall be provided by Contractor. Refer to attached section.

Section 08 36 13 - Sectional Doors:

Revised track size to 2 inches from 3 inches. Refer to attached section.

Section 08 42 29 - Sliding Automatic Entrances:

Section issued for exterior entrance as scheduled and as required by the Drawings.

Section 08 44 23 - Structural-Sealant-Glazed Curtain Walls:

Tests and inspection shall be provided by Contractor. Refer to attached section.

Section 08 88 53 - Security Glazing:

Replaced in its entirety. Refer to attached section.

Section 09 91 13 - Exterior Painting:

Tests and inspection shall be provided by Contractor. Refer to attached section.

Section 09 91 20 - Parking Pavement Markings:

Re-issued in its entirety.

Section 09 91 23 - Interior Painting:

Approved equal – Diamond Vogel. Refer to attached section.

Section 10 14 00 - Parking Signage:

Re-issued in its entirety.

Section 10 28 00 - Toilet, Bath, And Laundry Accessories:

Add Fire Department Lock Box. Refer to attached section.

Section 32 31 13 - Chain Link Fences and Gates: Specification added as required by Drawing

A100.1. Refer to attached section.

DRAWING ITEMS

Drawing G-100.0:

Code Matrix updated for State Building Permit.

Drawing G-101.0:

Signage Diagrams updated for State Building Permit. Details C8, D7, D9, F6, F9, H6, and H9 added to clarify locations of signage.

Drawing G-102.0:

Fire and Life Safety Plans updated for State Building Permit.

Drawing G-103.0:

Fire and Life Safety Plans updated for State Building Permit.

Drawing A-002.0:

Note added, "See Civil Drawings for Site Paving Elevations". Site paving elevations removed from drawing, Entry to Bicycle Center updated.

Drawing A-100.1:

Chain Link Fence updated in response to Addendum #2 Q141.

Drawing A-100.4:

Slab elevation adjusted as indicated.

Drawing A-100.5:

Wall heights clarified in response to Addendum #1 Q15

Drawing A-101.0:

Walls around generator room changed to type 1B. Note added to clarify that interior insulating drywall partition Type 2 shown in future retail space is N.I.C. Walls heights clarified in response to Addendum #1 Q13. Interior slab elevations adjusted as indicated.

Drawing A-102.0:

Doors 0200 and 0200-A changed to sliding doors. Room Retail Storage 0150-A renamed to City Storage. Note added to clarify that interior insulating drywall partition Type 2 shown in future retail space is N.I.C. Note added to indicate that walls above ramp are N.I.C. in response to Addendum #1 Q22. Area Drain added in Bicycle Parking Room 0204. *BB (Burnished Block) tag added to applicable Type 1B walls to clarify extent of Burnished Block.

Drawing A-103.0:

Note added to indicate that walls above ramp are N.I.C. in response to Addendum #1 Q22. Masonry walls removed in response to Addendum #1 Q23. Temporary cap for future stair pressurization note removed.

Drawing A-104.0:

Height of masonry walls clarified in response to Addendum #1 Q16.

Drawing A-200.0:

Note 6 added to General Notes for clarification in response to Addendum #1 Q9. Sections K2/A-403.0 and K6/A-403.0 added. *BB (Burnished Block) tag added to applicable Type 1B walls to clarify extent of Burnished Block in response to Addendum #1 Q5 and Q6.

Drawing A-201.0:

Note 6 added to General Notes for clarification in response to Addendum #1 Q9. Detail K4 added. Door U210A enlarged to 10'-0" from 8'-0" and changed to sectional door. *BB (Burnished Block) tag added to applicable Type 1B walls to clarify extent of Burnished Block in response to Addendum #1 Q5 and Q6.

Drawing A-202.0:

Note 6 added to General Notes for clarification in response to Addendum #1 Q9. *BB (Burnished Block) tag added to applicable Type 1B walls to clarify extent of Burnished Block in response to Addendum #1 Q5 and Q6. Note added for all center west vestibules indicating that temporary painted drywall closure should be provided. Note added at vestibule elevations "See sheets A-501.0 and A-501.5 for feature wall paint colors. Note revised to say "See G-101.0 for Mounting Heights and Vestibule Signage"

Drawing A-202.1:

Note 6 added to General Notes for clarification in response to Addendum #1 Q9. Vestibule ceiling heights and finishes clarified in response to Addendum #1 Q25.

Drawing A-203.0:

Note 6 added to General Notes for clarification in response to Addendum #1 Q9. Sections K2/A-403.0 and K6/A-403.0 added. *BB (Burnished Block) tag added to applicable Type 1B walls to clarify extent of Burnished Block in response to Addendum #1 Q5 and Q6. Note added to clarify the glass type for the transaction window. Note added to indicate that continuous spray cellulose insulation to be provided on bottom of deck below garage office. Wall around generator room changed to Wall Type 1B. Partition Type in garage office changed to 2A throughout.

Drawing A-203.1:

*BB (Burnished Block) tag added to applicable Type 1B walls to clarify extent of Burnished Block in response to Addendum #1 Q5 and Q6. Vestibule ceiling heights and finishes clarified in response to Addendum #1 Q25. Countertop height at sink revised.

Drawing A-203.2:

Detail F5 revised to indicate updated countertop height at sink. Detail D5 revised to note bulletproof glazing at transaction counter.

Drawing A-204.0:

Note 6 added to General Notes for clarification in response to Addendum #1 Q9. *BB (Burnished Block) tag added to applicable Type 1B walls to clarify extent of Burnished Block in response to Addendum #1 Q5 and Q6.

Drawing A-210.0:

Temporary slab and roof omitted in response to Addendum #1 Q19. Note added to indicate that Interior Insulating Drywall Partition Type 2 is N.I. C.

Drawing A-220.0:

Temporary slab and roof omitted in response to Addendum #1 Q19.

Drawing A-301.0:

Door 0200 revised to be a sliding glass door.

Drawing A-311.0:

Temporary slab at Level 3 ramp removed.

Drawing A-314.0:

Room Retail Storage 0150-A renamed to City Storage.

Drawing A-400.0:

Detail K4/A-451.2 tag revised in response to Addendum #1 Q38. Retail space shown as N.I.C. in response to Addendum #1 Q65. Detail G12/A-451.0 tagged.

Drawing A-401.0:

Detail tags revised in Section K6. Note revised in response to Addendum #1 Q65. Notes added on Section C6.

Drawing A-402.0:

Notes on Section D3 revised in response to Addendum #1 Q5. Detail G10 updated. Detail tags revised on Sections K3 and K6.

Drawing A-403.0:

Sheet added.

Drawing A-411.0:

Note added.

Drawing A-411.1:

Fire rated CMU wall revised in response to Addendum #1 Q48. Details F2 and F10 updated in response to Addendum #2 Q114

Drawing A-411.2:

Detail revised in response to Addendum #1 Q48.

Drawing A-411.3:

Note on Detail G2 revised in response to Addendum #1 Q66.

Drawing A-412.0:

Bicycle Center doors changed to sliding glass doors. Bicycle Center Signage indicated as N.I.C. in response to Addendum #2 Q114.

Drawing A-412.1:

Details F6, H2, and H6 updated to reflect sliding glass doors.

Drawing A-412.2:

Detail C7, D7, and F4 updated.

Drawing A-414.0:

Detail F11 updated.

Drawing A-414.1:

Details J9 and J12 updated.

Drawing A-451.0:

Added second subsoil drain to details G9 and K3A-451.1: Details J9 and J12 updated.

Drawing A-451.1:

Added second subsoil drain to details F11, F7, E4, K11, K4.

Drawing A-451.2:

Added second subsoil drain to details E11, K6.

Drawing A-500.0:

Partition Type 2A added. Partition Types 1 and 3 revised in response to Addendum #1 Q9. Note on Detail 8 revised to indicate that wood blocking is provided by contractor not by owner.

Drawing A-501.0:

Room Finish Schedule and Material Legend revised in response to Addendum #1 Q3 Q55 and Q56 and in response to Addendum #2 Q132 and Q136

Drawing A-501.1:

Note 1 was added and non-burnished concrete block is indicated as painted rather than stained on the plans in response to Addendum #1 Q6.

Drawing A-501.2:

Note 1 was added and non-burnished concrete block is indicated as painted rather than stained on the plans in response to Addendum #1 Q6.

Drawing A-501.3:

Note 1 was added and non-burnished concrete block is indicated as painted rather than stained on the plans in response to Addendum #1 Q6.

Drawing A-501.4:

Note 1 was added and non-burnished concrete block is indicated as painted rather than stained on the plans in response to Addendum #1 Q6.

Drawing A-501.5:

Note 1 was added and non-burnished concrete block is indicated as painted rather than stained on the plans in response to Addendum #1 Q6.

Drawing A-501.6:

Sheet added

Drawing A-502.0:

Door Types E and F revised. Details C9 and F11 changed from Overhead Coiling Door Detail to Sectional Door Detail. Schedule updated to reflect frame materials accurately in response to Addendum #1 Q54.

ATTACHED DRAWINGS (FULL SIZE):

G-100.0

G-101.0

G-102.0

G-103.0

A-002.0

A-100.1

A-100.4

A-100.5

A-101.0

A-102.0

A-103.0

A-104.0

A-200.0

A-201.0

A-202.0

A-202.1

A-203.0

A-203.1

A-203.2

A-204.0

A-210.0

A-220.0

A-301.0

A-311.0

A-314.0

A-390

A-401.0

A-402.0

A-403.0

A-411.0

A-411.1

A-411.2

A-411.3

A-412.0

A-412.1

A-412.2

A-414.0

A-414.1

A-451.0

A-451.1

A-451.2

A-500.0

A-501.0

A-501.1

A-501.2

A-501.3

A-501.4

A-501.5

A-501.6

A-502.0

ATTACHED SPECIFICATIONS:

- 00 00 05 - Table of Contents
- 01 23 00 - Alternates
- 04 22 00 - Concrete Unit Masonry
- 04 42 00 - Exterior Stone Cladding
- 05 40 00 - Cold-Formed Metal Framing
- 05 50 00 - Metal fabrications
- 06 16 00 - Sheathing
- 07 13 26 - Blindsight Self-Adhering Sheet Waterproofing
- 07 13 52 - Modified Bituminous Sheet Waterproofing
- 07 84 13 - Penetration Firestopping
- 08 36 13 Sectional Doors
- 08 42 29 - Sliding Automatic Entrances
- 08 44 23 - Structural-Sealant-Glazed Curtain Walls
- 08 88 53 - Security Glazing
- 09 91 13 - Exterior Painting
- 09 91 20 - Parking Pavement Markings
- 09 91 23 - Interior Painting
- 10 14 00 - Parking Signage
- 10 28 00 - Toilet, Bath, And Laundry Accessories
- 32 31 13 - Chain Link Fences and Gates

STRUCTURAL

SPECIFICATION ITEMS

None

DRAWING ITEMS

Drawings S-001.0: Update to footing subgrade. Update to construction joint requirements in slabs and beams.

Drawings S-100.1: Addition of control joint in ramp slab. Removal of incorrect slab call-out.

Drawings S-100.3: Section added to clarify slab-to-wall connection.

Drawings S-100.5: Removal of incorrect slab call-out.

Drawings S-101.0: Steel beam sizes updated near entrance. Addition of slab step symbol. Annotation clarification. Ramp slab sloping updated.

Drawings S-102.0: Addition of Not in Contract (NIC) region. Addition of beam tags.

Drawings S-103.0: Addition of temporary slabs above elevator and stair openings.

Drawings S-104.0: Addition of concrete beam tags. Update to Not in Contract (NIC) region.

Drawings S-120.5: Update to slab reinforcement.

Drawings S-122.0: Beam graphic clarification.

Drawings S-201.0: Addition of hooked bars at footing reinforcement. RF1.5 added to footing schedule. Bentonite water stop added to foundation section. Reinforcement clarification.

Drawings S-204.0: Waterproofing/ERS graphics updated for all wall sections. Addition of shear keys. Dimensions added to detail 8.

Drawings S-301.3: Extent of Not in Contract (NIC) region updated.

Drawings S-301.4: Extent of Not in Contract (NIC) region updated.

Drawings S-306.0: Addition of B64 to beam schedule (beam on L4). Modifications to B42 and B43 due to updates in slab slope at ramp.

Drawings S-307.0: Addition of (3) details for typical slab-to-wall connections.

Drawings S-312.0: Dimension clarification. Stair nose angle note added to slab-on-grade stair section.

Drawings S-314.0: Graphics updated on all sections.

Drawings S-501.0: Section added for steel beam at L1 entrance sign. Clarification of concrete slab.

ATTACHED DRAWINGS (FULL SIZE):

S-001.0

S-100.1

S-100.3

S-100.5

S-101.0

S-102.0

S-103.0

S-104.0

S-120.5

S-122.0

S-201.0

S-204.0

S-301.3

S-301.4

S-306.0

S-307.0

S-312.0

S-314.0

S-501.0

ATTACHED SPECIFICATIONS:

None.

PARKING CONTROL

SPECIFICATION ITEMS

None

DRAWING ITEMS

Drawing PA-100.3: Changed sign S-15 to read "Reserved for Official City of Madison Vehicles".

Drawing PA-101.0: On Detail 2/PA-401.0 added electric traffic control signs and AVI card readers at the entrance/exit lanes. Note that the City of Madison will procure the parking access and revenue control equipment (PARCS) directly from HUB. HUB will place all their equipment on the project; however, all electrical and communications work associated with the PARCS is part of this project.

Drawing PA-101.0: On Detail 3/PA-401.0 added on electric traffic control sign and AVI card readers at the entrance/exit lanes. Note that the City of Madison will procure the parking access and revenue control equipment (PARCS) directly from HUB. HUB will place all their equipment on the project; however, all electrical and communications work associated with the PARCS is part of this project.

Drawing PA-401.0: Added an Equipment Legend.

Drawing PA-401.0: Added Note: 1. The City of Madison will be procuring the parking access and revenue control equipment (PARCS) directly from HUB. HUB will place all their equipment on the project; however, all electrical and communications work associated with the PARCS is part of this project. This includes installation of the detector loops.

Drawing PA-401.0: On Detail 2 added electric traffic control signs and AVI card readers.

Drawing PA-401.0: On Detail 3 added electric traffic control sign and AVI card readers.

Drawing PA-601.0: On the sign schedule for sign S15 changed the text/message to read "Reserved for Official City of Madison Vehicles".

Drawing PA-601.0: On the sign schedule for sign S26A added an arrow to the text/message and added the remark to read "Super Graphic Painted on Wall - 12" High Blue Letters on White Stained Concrete Wall".

Drawing PA-701.0: On Detail 8 changed the stripe length to 18'-0".

ATTACHED DRAWINGS (FULL SIZE):

PA - 100.3

PA - 101.0

PA - 401.0

PA - 601.0

PA - 701.0

ATTACHED SPECIFICATIONS:

None.

MECHANICAL

SPECIFICATION ITEMS

Section 20 0573:

Revise paragraph 1.7 C to delete "Owner's" and replace with "Contractor's". Revise paragraph 3.4 A to delete "Owner" and replace with "Contractor".

Section 23 2116:

Revise paragraph 1.7 B 3 to delete "Owner's" and replace with "Contractor's". Revise paragraph 1.7 B 4 to delete "Owner's" and replace with "Contractor's".

Section 23 5100:

Add paragraph 1.1 related work, item B Section 23 2116 Pipe and Pipe Fittings. Add paragraph 2.3 specification for engine exhaust vent pipe roof curb. Revise paragraph 3.1 B in include roof flashing, counter flashing and necessary supports for engine exhaust vent pipe installation.

DRAWING ITEMS

Drawing M-100.5:

Revise ductwork. Notation of high pressure ductwork added. Notation to show stainless steel duct connection from area well air intake added. Refer to attached drawing for details.

Drawing M-101:

Revised drawing to include new Section 6/M-400. Notation of high pressure ductwork added. Revise Sheet Key Note 4. regarding louver provision. Revise label notation of louver provision. Notation to show stainless steel duct connection from area well air intake added. Refer to attached drawing for details.

Drawing M-102:

Revise Sheet Key Note 1. regarding louver provision. Revise label notation of louver provision. Notation of high pressure ductwork added. Refer to attached drawing for details.

Drawing M-400:

Revise detail numbering. Revised drawing to include new Section 6/M-400 SF-5 Intake detail. Revise Sections 2/M-400 and 3/M-400 to show stainless steel duct connection from area well air intake. Refer to attached drawing for details.

Drawing M-401:

Revise ductwork. Refer to attached drawing for details.

Drawing M-500:

Revise notation regarding louver provision on 3/ M-500 and 13/ M-500. Detail 12/M-500 renamed. Refer to attached drawing for details.

PLUMBING

SPECIFICATION ITEMS

None.

DRAWING ITEMS

Drawing P-100.5:

Revise invert elevation of 6" SAN for future use out north wall (plan west). Add 4" SAN up/down for added area drain on level 2. Add 3/4" DCW up for added hose bibb on level 2.

Drawing P-101.0:

Add 4" SAN up/down for added area drain on level 2. Add 3/4" DCW up/down for added hose bibb on level 2.

Drawing P-102.0:

Add area drain AD-1. Add 3/4" DCW and HB-1.

Drawing P-700:

Add 3/4" DCW and HB-1 for Bicycle Storage area.

Drawing P-701:

Revise invert elevation of 6" SAN for future use out north wall (top of sheet). Add sanitary piping for added area drain in Bicycle Storage area on level 2. Revise drainage fixture units (DFUs) numbers on downstream piping.

ELECTRICAL

SPECIFICATION ITEMS

None.

DRAWING ITEMS

Drawing E-100.5:

Revise lighting control for Main Electrical Room U006.

Add time clock location in Main Electrical Room U006 and keynote #2 describing functionality.

Drawing E-101.0:

Revise lighting circuits in entry way and keynote #2 describing functionality of time clock usage with new circuits.

Drawing E-102.0:

Revise lighting circuits in entry way and keynote #3 describing functionality of time clock usage with new circuits.

Drawing E-110.3:

Add receptacle in RM U206 and keynote #9 for ERRCS.

Drawing E-110.5:

Add receptacle in RM U001 and keynote #24 for telecommunications rack.

Drawing E-120.1:

Add emergency responder radio coverage system.

Add telecommunication boxes, conduits and outlets.

Add elevator lobby emergency call stations.

Drawing E-120.2:

Add emergency responder radio coverage system.

Add telecommunication boxes and conduits.

Add elevator lobby emergency call stations.

Drawing E-120.3:

Add emergency responder radio coverage system.

Add telecommunication boxes, conduits and outlets.

Add elevator lobby emergency call stations.

Drawing E-120.4:

Add emergency responder radio coverage system.

Add telecommunication boxes and conduit.

Add elevator lobby emergency call stations.

Drawing E-120.5:

Add emergency responder radio coverage system.

Add telecommunication boxes and conduits.

Add elevator lobby emergency call stations.

Drawing E-121.0:

Add emergency responder radio coverage system.
Add telecommunication boxes, conduits and outlets.
Add elevator lobby emergency call stations.

Drawing E-122.0:

Add emergency responder radio coverage system.
Add elevator lobby emergency call stations.

Drawing E-400:

Revise location of utility meter and fire alarm equipment in Main Electrical Room U006.
Add time clock location in Main Electrical Room U006 and keynote #19 describing functionality.

Drawing E-401:

Add new sheet.

Drawing E-604.0:

Add description for breaker 51 in panel U1SPLD1.

Drawing E-605.0:

Add description for breaker 13 in panel L1LPLB1.

TECHNOLOGY

SPECIFICATION ITEMS

Section 27 32 43 – Radio Communications equipment

Remove this specification from the project. This specification does not apply to this project.

Section 27 0000 – General Communications Requirements

New added specification to project.

Section 27 0526 – Grounding and Bonding for Communications Systems

New added specification to project.

Section 27 0528.29 – Hangers and Supports for Communications Systems

New added specification to project.

Section 27 0528.33 – Raceway and Boxes for Communications Systems

New added specification to project.

Section 27 0553 – Communications Systems Identification

New added specification to project.

Section 27 1000 – Structured Cabling

New added specification to project.

Section 27 1100 – Communications Equipment Room Fittings

New added specification to project.

Section 27 1500 – Communications Horizontal Cabling

New added specification to project.

Section 27 5129 – Emergency Communication System

New added specification to project.

Section 27 5319 – Emergency Responder Radio Coverage System

New added specification to project.

DRAWING ITEMS

None.

ATTACHED MEP/TECHNOLOGY DRAWINGS (FULL SIZE):

M-100.5:

M-101:

M-102:

M-400:

M-401:

M-500:

P-100.5:

P-101.0:

P-102.0:

P-700:

P-701:

E-100.5:

E-101.0:

E-102.0:

E-110.3:

E-110.5:

E-120.1:

E-120.2

E-120.3:

E-120.4:

E-120.5:

E-121.0:

E-122.0:

E-401:

E-604.0:

E-605.0:

ATTACHED SPECIFICATIONS:

20 0573

23 2116

23 5100

27 0000

27 0526

27 0528.29

27 0528.33

27 0553

27 1000

27 1100

27 1500

27 5129

27 5319

CLARIFICATIONS

Q113: Will the metal plate be anchored to the wall? Or will it be set with the concrete wall? Is there a requirement for a plywood blocking if per E8/A-500.0 "Wood signage by Owner"? If so, is the plywood blocking chemically or mechanically adhered/ attached to the metal pane?

A113: The metal plate has been deleted. The wood sign blocking is to be mechanically fastened directly to the concrete with stainless steel sleeve anchors.

Q114: * Unable to locate a detail for sign type S26A (SUPER GRAPHIC) and need to determine size.

* Unable to locate construction details for S27, S24, S25, S26, S29.4 Mud Slab.

*Unable to locate a Sign Schedule for interior signs that show up on G-101.0 Are these part of the project?

* There are a few sets of what appear to be dimensional letters on building elevations. For example A-412.0 (Bicycle Center). There are not explicitly called out on the sign schedule on PA-601.0. Are these and other letter sets that show up on exterior elevations part of the project?

A114: See revised sheet G101.0. Sign S26A is a Super Graphic painted on the wall with 12 " high blue letters on the white stained concrete wall. Bicycle Center signage is Not In Contract all other signage per PA drawings.

Q115: Section K3/A-402.0 On Column 12, Elev. 907'-0" Detail - Is material shown above El 907'-0" a concrete or CMU curb? (Sim. K6/A-402.2, Col 1, El 900'-0")

A115: 4" High concrete curb.

Q116: Is the concrete curb (3/A-500) anchored to the slab it sits atop of? Is there a structural detail for these conditions? Is a radius curb required between Col. 7 & A.6 and Col 6 & B. Please provide a section cut through curb for the parking lot equipment and the pad in front of Door #0105.

A116: Curb reinforcement provided in detail 16 and 17/S-202.0. Concrete pad detail provided in 18/S-202.0

Q117: On drawing A-411.0 there are coated aluminum panels above the door opening between column lines B.2 and C at elevation F3. At wall section K7/A-411.2 air and water barrier is called out behind this panel. Is air and water barrier required behind this panel as the barrier is not called out at details J7 and J9 for a similar wall condition?

A117: Yes - J7 and J9 are not enclosing interior space. Also, air & water barrier at aluminum sign band on J2/a-414.1 deleted.

Q118: Please confirm the sheet barrier product specified in spec section 07 27 15.13 is intended to be installed behind the metal panel specified in section 07 42 13.16.

A118: Yes - sheet barrier product is intended to be installed behind the metal panel.

Q119: Does the EC provide gas detection?

A119: No - Gas detection is within Mechanical specification 23 09 03

Q120: The spec says no conduit in slabs above grade. Does all conduit to lighting, rec, fire alarm, etc. have to be rigid/IMC at the ceiling or can EMT be used?

A120: Refer to specification 260533 for raceway and box requirements. EMT and other conduit types are allowed to be used as specified. Per specification 260533 EMT is allowed in interior partitions, above suspended ceilings and 6ft AFF in exposed areas of mechanical equipment rooms.

Q121: The aluminum panel over the Pinckney Street door openings is detailed differently than at Doty and Wilson Street. The manufacturer's standard details from Protean Construction Products (as specified in section 07 27 15.13) indicate that we should follow details similar to F2 & F10 on A-411.2. Is an insulation product to be used behind the metal wall panel as indicated at detail D2/A-412.2?

A121: Follow details Sim. To A-411.2. Details on A-412.2 modified.

Q122: Sheet M-101.0 General note 1 states that ACC is to be mounted by mechanical contractor but on column line 6 ACC-2 unit is called to be wall mounted by the GC. Please confirm that the mechanical contractor is to perform this work and not the general contractor.

A122: GC to determine.

Q123: Per item 109.9 of the proposal, contract, bond, and specifications it states that liquidated damages are to be incorporated into the project. Item 109.9 in the City's standard specifications gives a table for how liquidated damages are to be accessed, if they are incurred and include a calendar day and working day charge. Please clarify for this project if the contractor will be accessed the calendar day charge or the working day charge if liquidated damages are incurred.

A123: Calendar

Q124: Who does the City of Madison currently contract with for security cameras?

A124: Camera make and model to be provided in AD-02.

Q125: Where are the drawings located for the Radio Communication Equipment that is mentioned in the Division 27 scope of work?

A125: That specification section was deleted as inapplicable. Emergency responder radio provisions added to Addendum #2.

Q126: What is the city's generalized intent with Radio Communication Equipment?

A126: City intent is to have radio communication ability in the entire ramp.1

Q127: Specification section 10 14 23.16 specifies room identification signage and sheet G-101.0 details it but there is no floor plan or legend that tells bidders where to provide each sign. Please provide more information for where each type of sign is to be provided.

A127: See revised Sheet G-101.0.

Q128: Surface Sealers - There is a specification (071816 - Vehicular Coatings) and notes within the documents for Traffic Bearing membrane. However it is not listed on Room Finish Schedule and Material Legend, Sheet A-501.0.

A128: Vehicular Traffic Coatings have been deleted from the project.

Q129: Surface Sealers - Under Paragraph C, Note 1 - requires a Saline sealer at all parking and vehicular areas. Paragraph C, Note 2 - requires traffic bearing membrane in all areas. Are both statements true for all levels?

A129: Vehicular Traffic Coatings have been deleted from the project.

Q130: Understanding that single components traffic membrane are solvent base. Under specification 071816-2 please provide which product line for each manufacturer is recommended and acceptable.

A130: Vehicular Traffic Coatings have been deleted from the project.

Q131: Is a traffic bearing membrane also required on U4 as well as the Concrete Sealer (071816-3 Paragraph H)?

A131: No.

Q132: Section 07 18 16 P265 is traffic coatings. Has this item been eliminated?

A132: Vehicular Traffic Coatings have been deleted from the project.

Q133: Section 08 88 53 P359 Security Glazing - Is office window going to have security glazing?

A133: Section deleted. Office window to have bullet resistant polycarbonate per Section 088853

Q134: Section 32 21 16 Pipe and Pipe fittings P. 192 line 31-33 states black malleable iron for natural gas pipe. I thought we had discussed a galvanized or other corrosion resistant finish?

A134: Corrosion protective finish to be provided per specification Section 23 2116 3.18. (Included in Addendum 2)

Q135: Section 28 20 00 Video Surveillance System. Are IP Cameras P. 447 Lines 37-39 the models city IT prefers?

A135: The models in the specification are from the approved manufacturer and compatible with the existing video surveillance system. The specific models are as discussed with the City of Madison Parking group to achieve the requested level of resolution, coverage and performance within the areas of coverage.

Q136: Sheet A-101.0 (P27) shows a note (between A and A.3 and 5 and 6) "traffic coating throughout". This note should be deleted?

A136: Vehicular Traffic Coatings have been deleted from the project.

Q137: Sheet A-102.0 (P23). Is there a floor drain for the bicycle parking (near B.5 and 10) area accessed off Doty St? If not, suggest a floor drain and hose bib for washing down the floor as bicycles drop a lot of salt and debris on the floor in the winter.

A137: Drain and Hose bib added.

Q138: Sheet A-203.1 (P 39) Clear Laminate glass is shown for customer service window to office. Do we want a security rated glass here?

A138: Revised to security glazing.

Q139: Sheet A-300.0 P 47. Limestone is shown west of the driveway exit. Some comment on detail sheet A-411.0 P 61. Have requested that this be opened up to provide vision between pedestrians and exiting vehicles.

A139: ODD approved current elevations

Q140: Sheet A-302.0 P 49 Vision clearance between apt exit and peds? Open ped doorway and stainless railing should provide some vision. (see also A=414.0 P 70)

A140: Railing to provide vision.

Q141: Sheet P-100.1 P. 158. Suggest that the fence by the sump pumps be extended across the entire length of the bay. The current fencing leaves two inaccessible areas next to the last parking stalls. Better to have these areas inaccessible to the public.

A141: The west side of fence is required for exit access at stairs. East side extended.

Q142: Sheet E-601 P. 197. Luminaire type F2A is shown as 277V. All lighting fixtures should be 120 Volt. Please change this fixture to a 120V spec.

A142: All lighting is circuited at 277V.

Q143: Sheet E-602 through E-605 and E-700 pp. 198-202. Fan motors appear to be shown as 480V. Please explain why 480V is used rather than three phase 208V. Does MG & E have 480 V service available?

A143: The parking structure is provided with a 277/480V service. Typical motors 1/2HP and larger in the parking structure are 480V.

Q144: Sheet PA-100.3 P. 229 and detail 15 sheet PA-601.0 P. 235: legend for sign S-15 reads "Reserved Parking" should this read "Reserved for Official City of Madison Vehicles" ?

A144: Sign S15 has been changed to read "Reserved for Official City of Madison Vehicles".

Q145: Sheet PA-701.0 P. 236: Striping detail 7 and 8 show depth of stall lines 16'-6". Prefer this to be 18' - 0".

A145: The depth of stall lines has been changed to 18'-0".

Q146: Please provide as-built information, including plans, sections, type of elements, elevations, depths, offsets, of the foundations of the Madison Municipal Building. This information is required to determine the geometry and the impact of the existing structures to the design of the earth retention system and underpinning.

A146: As-built information will be included as an Exhibit to AD-02.

Q147: Please provide as-built information, including plans, sections, type of elements, elevations, depths, offsets, of the foundations of the Government East Parking Garage. This information is required determine the geometry and the impact of the existing structures to the design of the earth retention system and underpinning.

A147: As-built information will be included as an Exhibit to AD-02.

Q148: Will an earth retention specification be provided?

A148: No. Earth retention design is by Contractor in consultation with Geotechnical.

Q149: Will a dewatering specification be provided?

A149: No dewatering design is by Contractor in consultation with Geotechnical.

Q150: Please clarify the maximum offset the earth retention can have from the alignment of the final structure. Various earth retention systems have different verticality tolerances, so please consider this when defining the offset, especially considering blindside waterproofing has been specified for this deep excavation.

A150: Structural foundation walls shall be placed at locations and thicknesses specified on drawings. ERS must be installed at a distance to allow for vertical tolerances without impeding on the structural walls.

Q151: Please clarify if tiebacks can be installed beneath surrounding streets and buildings. Is there a limit to the length (horizontal and vertical) of tiebacks?

A151: ERS tie backs may be installed beneath surrounding streets and buildings, provided that extreme care and pre-planning is implemented by the installing contractor so as to avoid any clash with all existing underground utilities and structures.

Q152: Drawings A-450.1 and A-450.3 have details that show the earth retention system encroaching or penetrating into the final structural concrete wall. Please clarify how far the earth retention system can penetrate into the final structural concrete wall. Is there a limit on the number and size of the penetrations into the structural concrete wall?

A152: The intent is to allow the structural wall to encroach on the structural wall and to penetrate it only minimally. The earth retention system (designed by others) will require coordination with structural and waterproofing design. Additional wall reinforcement per 6 or 7/S-203.0 shall be installed at all locations where ERS is encroaching or penetrating the structural concrete wall.

Q153: The contract documents specify blindside waterproofing. Can any earth retention system be used with the waterproofing systems or will restrictions be applied?

A153: Any earth retention system must be able to comply with all requirements (if any) of the waterproofing manufacturer.

Q154: As a follow-up regarding testing, Section 01 45 29 states that the contractor shall employ and pay for independent testing lab for specified services and testing of Section 31 20 00 (earthwork). However, Specification 31 20 00, Section 3.18 states that the owner will engage geotechnical engineering testing agency to perform tests and inspections. Can you please clarify if soil testing is the responsibility of the owner (City) or contractor?

A154: Soil testing is the responsibility of the contractor.

ADDITIONAL INFORMATION FOR REFERENCE

Exhibit A – Environmental Site Assessment

Exhibit B – Government East As-Built Drawings 1964 Addition

Exhibit C – Government East As-Built Drawings 1957

Exhibit D – HUB Doty St. Entry/Exit Drawing

Exhibit E – HUB Level 01 Pay Station Drawing

Exhibit F – HUB Level 01 Reversible Ramp Drawing

Exhibit G – MMB Annex Foundation Plans

Please acknowledge this addendum on page E1 of the contract documents and/or in Section E: Bidder's Acknowledgement on Bid E. Electronic version of these documents can be found on Bid Express at <https://www.bidexpress.com/>

If you are unable to download plan revisions associated with the addendum, please contact the Engineering office at 608-266-4751 to receive the material by another method.

For questions regarding this bid, contact:

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31	27 0000	General Communications Requirements
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49	32 3119	Decorative Metal Fences and Gates
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51	32 9300	Plants
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53		Not Used
54	END OF DOCUMENT	

JOYTHAN VAN HOOK DESTEFANO AND ARCHITECTS LLC
28 JULY 2017

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ISSUED FOR ADDENDUM #2
JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE
CONTRACT # 7952 MUNIS # 11471

SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
- 1.2 SUMMARY
- 1.3 DEFINITIONS
- 1.4 PROCEDURES

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

- 3.1 SCHEDULE OF ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other work of the Contract.
- C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. S-1: CONCRETE ADMIXTURES.
 - 1. Base Bid: Provide concrete mix designs and admixtures per drawing schedule.
 - 2. Alternate: Provide crystalline admixture in the scheduled concrete mix design for the structural decks.
- B. Alternate No. A-1: VEHICULAR TRAFFIC COATINGS.
 - 1. Base Bid: Provide vehicular traffic coatings as indicated on Drawings A-100.2, A-100.3, A-100.4, A-100.5, A-101.0, and A-203.0 and as specified in Section 07 18 16 "Vehicular Traffic Coatings".
 - 2. Alternate: Delete vehicle traffic coatings scope of Work as indicated on Drawings A-100.2, A-100.3, A-100.4, A-100.5, A-101.0, and A-203.0 and as specified in Section 07 18 16 "Vehicular Traffic Coatings".

ISSUED FOR ADDENDUM 2

JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE

CONTRACT # 7952 MUNIS # 11471

012300 - 1

ALTERNATES

LOTHAN VAN HOOK DESTEFANO AND ARCHITECTS LLC
28 JULY 2017

1

END OF SECTION 01 23 00

ISSUED FOR ADDENDUM 2
JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE
CONTRACT # 7952 MUNIS # 11471

012300 - 2

ALTERNATES

SECTION 04 22 00
CONCRETE UNIT MASONRY

- 1
2
3 PART 1 – GENERAL
4 1.1 SUMMARY
5 1.2 DEFINITIONS
6 1.3 ACTION SUBMITTALS
7 1.4 INFORMATIONAL SUBMITTALS
8 1.5 QUALITY ASSURANCE
9 1.6 FIELD CONDITIONS
10 PART 2 – PRODUCTS
11 2.1 UNIT MASONRY, GENERAL
12 2.2 CONCRETE MASONRY UNITS
13 2.3 NON-LOADBEARING BURNISHED CONCRETE MASONRY UNITS
14 2.4 CONCRETE LINTELS
15 2.5 MORTAR AND GROUT MATERIALS
16 2.6 REINFORCEMENT
17 2.7 MISCELLANEOUS MASONRY ACCESSORIES
18 2.8 MORTAR AND GROUT MIXES
19 PART 3 – EXECUTION
20 3.1 INSTALLATION, GENERAL
21 3.2 TOLERANCES
22 3.3 LAYING MASONRY WALLS
23 3.4 MORTAR BEDDING AND JOINTING
24 3.5 MASONRY-JOINT REINFORCEMENT
25 3.6 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE
26 3.7 FIELD QUALITY CONTROL
27 3.8 REPAIRING, POINTING, AND CLEANING
28 3.9 MASONRY WASTE DISPOSAL

29 PART 1 - GENERAL

- 30 1.1 SUMMARY
31 A. Section Includes:
32 1. Concrete masonry units.
33 B. Related Sections:
34 1. Steel and concrete lintels: Refer to Structural General Notes and Drawings.
- 35 1.2 DEFINITIONS
36 A. CMU(s): Concrete masonry unit(s).
37 B. Indigenous Materials: Materials and products that are manufactured within 300 miles (482 km) of Project
38 site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 300
39 miles (482 km) of Project site.
- 40 1.3 ACTION SUBMITTALS
41 A. Product Data: For each type of product.
42 B. Sustainable Design Submittals:
43 1. Product Certificates: For regional materials, indicating location of material manufacturer and point of
44 extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each
45 regional material.
46 C. Samples: For each type and color of the following:
47 1. Exposed CMUs.
48 2. Pigmented and colored-aggregate mortar.
49

- 1 1.4 INFORMATIONAL SUBMITTALS
- 2 A. Material Certificates: For each type and size of product. For masonry units, include data on material
- 3 properties and material test reports substantiating compliance with requirements.
- 4 B. Mix Designs: For each type of mortar, Include description of type and proportions of ingredients.
- 5 1. Include test reports for mortar mixes required to comply with property specification. Test according
- 6 to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and
- 7 ASTM C 91/C 91M for air content.
- 8 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive
- 9 strength requirement.
- 10 1.5 QUALITY ASSURANCE
- 11 A. Comply with the applicable recommendations of the TEK Information Series, National Concrete Masonry
- 12 Association, (N.C.M.A.), current editions, in addition to the requirements specified herein.
- 13 B. Comply with the requirements of TMS 602/ACI 530.1/ASCE 6, Building Code Requirements for Masonry
- 14 Structures & TMS 602/ACI 530.1/ASCE 6, Specifications for Masonry Structures, current editions.
- 15 C. Sample Panels: Build sample panels to verify workmanship under Sample submittals and to demonstrate
- 16 test methods. Comply with requirements in Section 01 43 39 "Quality Requirements" for mockups.
- 17 1. Build sample panels for typical interior burnished concrete masonry walls in sizes approximately 60
- 18 inches long by 48 inches high by full thickness.
- 19 1.6 FIELD CONDITIONS
- 20 A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do
- 21 not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions.
- 22 Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
- 23 B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in
- 24 TMS 602/ACI 530.1/ASCE 6.
- 25 PART 2 - PRODUCTS
- 26 2.1 UNIT MASONRY, GENERAL
- 27 A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the
- 28 Contract Documents.
- 29 B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain
- 30 chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in
- 31 the completed Work.
- 32 C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
- 33 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified
- 34 testing agency acceptable to authorities having jurisdiction.
- 35 2. Tests shall comply with UL 618 "Standards of Concrete Masonry Units".
- 36 3. Each unit shall be stamped "Classified UL--See Certificate".
- 37 2.2 CONCRETE MASONRY UNITS
- 38 1. 6" Nominal width: CMU-1
- 39 2. 8" Nominal width: CMU-2,
- 40 B. Regional Materials: CMUs shall be manufactured within 300 miles of Project site.
- 41 C. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of
- 42 adjacent units unless otherwise indicated.
- 43 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and
- 44 other special conditions.
- 45 D. Integral Water Repellent: Provide units made with integral water repellent for exposed units and where
- 46 indicated. Supply the water repellent in above-grade exterior CMU walls.
- 47 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products
- 48 that may be incorporated into the Work include, but are not limited to the following:
- 49 a. ACM Chemistries.
- 50 b. BASF Corporation; Construction Systems.
- 51 c. GCP Applied Technologies (formerly Grace Construction Products).
- 52 E. CMUs: ASTM C 90.
- 53 1. Density Classification: Medium weight.
- 54

- 1 **2.3 NON-LOADBEARING BURNISHED CONCRETE MASONRY UNITS**
- 2 A. Basis of Design: Premier Ultra Burnished masonry units as manufactured and distributed by County
- 3 Materials Corporation.
- 4 B. Acceptable manufacturers providing comparable products shall be Anchor Block Company, and Air Vol
- 5 Block.
- 6 C. Description: Integrally pigmented burnished units. Normal weight, integrally pigmented hollow units with
- 7 burnished faces as scheduled or required and with a net area compressive strength of greater than or equal
- 8 to 1900 psi.
- 9 1. Compliance: ASTM C 90.
- 10 2. Coloring: Integral, through-body coloring; synthetic or natural iron oxide pigments.
- 11 3. Integral Polymer Emulsion Water Repellent as provided by manufacturer.
- 12 4. Size and Shape: As indicated on Drawings.
- 13 5. Color: County Materials Corporation, Premier Ultra 63 - 218C, Sea Salt.
- 14 6. Mortar – Colored Mortar to match Architect's sample
- 15 7. Provide field applied anti-graffiti coating.
- 16 **2.4 CONCRETE LINTELS**
- 17 A. Refer to Structural Drawings.
- 18 B. Concrete Lintels: ASTM C 1623, matching CMUs in color, texture, and density classification; and with
- 19 reinforcing bars indicated. Provide lintels with net-area compressive strength not less than that of CMUs.
- 20 **2.5 MORTAR AND GROUT MATERIALS**
- 21 A. Regional Materials: Aggregate for mortar and grout, cement, and lime shall be manufactured within 300
- 22 miles of Project site.
- 23 B. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather
- 24 construction. Provide natural color or white cement as required to produce mortar color indicated.
- 25 C. Hydrated Lime: ASTM C 207, Type S.
- 26 D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other
- 27 ingredients.
- 28 E. Aggregate for Mortar: ASTM C 144.
- 29 1. White-Mortar Aggregates: Natural white sand or crushed white stone.
- 30 2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required
- 31 mortar color.
- 32 F. Aggregate for Grout: ASTM C 404.
- 33 G. Colored Cement Products: Packaged blend made from portland cement and hydrated lime or mortar cement
- 34 and mortar pigments, all complying with specified requirements, and containing no other ingredients.
- 35 1. Formulate blend as required to produce color indicated or, if not indicated, as selected from
- 36 manufacturer's standard colors.
- 37 2. Pigments shall not exceed 10 percent of portland cement by weight.
- 38 3. Pigments shall not exceed 5 percent of mortar cement by weight.
- 39 H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with
- 40 ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of
- 41 composition indicated.
- 42 I. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing
- 43 integral water repellent from same manufacturer.
- 44 J. Water: Potable.
- 45 **2.6 REINFORCEMENT**
- 46 A. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
- 47 1. Ladder Type Reinforcing: Provide in lengths of not less than 10 feet, with prefabricated corner and
- 48 tee units.
- 49 2. Interior Walls: Mill- galvanized, carbon steel.
- 50 3. Exterior Walls: Hot-dip galvanized carbon steel.
- 51 4. Wire Size for Side Rods: 0.187-inch diameter.
- 52 5. Wire Size for Cross Rods: 0.187-inch diameter.
- 53 6. Spacing of Cross Rods: Not more than 16 inches o.c.

- 1 2.7 MISCELLANEOUS MASONRY ACCESSORIES
- 2 A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to
- 3 35 percent; of width and thickness indicated; formulated from neoprene.
- 4 B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with
- 5 ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral
- 6 stability in masonry wall; size and configuration as indicated on Structural Drawings..
- 7 C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt
- 8 felt).
- 9 D. Top of wall restraint anchors: one of the following: Refer to Structural Drawings.
- 10 1. Homan and Bernard PTA series anchors: PTA 420 with plastic tube sleeve
- 11 2. Wire Bond partition top anchor 4301 with plastic tube sleeve
- 12 3. Heckman masonry wall stabilizer #19 with #421 plastic tube sleeve
- 13 2.8 MORTAR AND GROUT MIXES
- 14 A. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-
- 15 resistant agents, antifreeze compounds, or other admixtures unless otherwise indicated.
- 16 1. Do not use calcium chloride in mortar or grout.
- 17 2. Use masonry cement mortar unless otherwise indicated.
- 18 3. Use portland cement-lime mortar.
- 19 4. For reinforced masonry, use portland cement-lime or masonry cement mortar.
- 20 5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view,
- 21 regardless of weather conditions, to ensure that mortar color is consistent.
- 22 B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities
- 23 by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- 24 C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of
- 25 mortar for applications stated unless another type is indicated.
- 26 1. For mortar parge coats, use Type S or Type N.
- 27 2. For interior nonload-bearing partitions, Type O may be used instead of Type N.
- 28 D. Grout for Unit Masonry: Comply with ASTM C 476.
- 29 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with
- 30 TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
- 31 2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day
- 32 compressive strength indicated, but not less than 2000 psi.
- 33 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

34 PART 3 - EXECUTION

35 3.1 INSTALLATION, GENERAL

- 36 A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit
- 37 adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units
- 38 to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible,
- 39 cut edges concealed.

40 3.2 TOLERANCES

- 41 A. Dimensions and Locations of Elements:
- 42 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4
- 43 inch.
- 44 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
- 45 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4
- 46 inch in a story height or 1/2 inch total.
- 47 B. Control and Expansion Joints:
- 48 1. Provide vertical control and building expansion joints in masonry where shown on the Drawings. If
- 49 not shown on the Drawings, comply with the recommendations of NCMA as reviewed by the Architect
- 50 prior to construction of joint. Confirm with Structural Engineer and Architect before laying out walls.
- 51

- 1 C. Lines and Levels:
- 2 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10
- 3 feet, or 1/2-inch maximum.
- 4 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level
- 5 by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
- 6 3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in
- 7 20 feet, or 1/2-inch maximum.
- 8 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and
- 9 control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch
- 10 maximum.
- 11 5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet,
- 12 or 1/2-inch maximum.
- 13 D. Joints:
- 14 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a
- 15 maximum thickness limited to 1/2 inch.
- 16 2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus
- 17 1/4 inch.
- 18 3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.
- 19 **3.3 LAYING MASONRY WALLS**
- 20 A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and
- 21 for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size
- 22 units, particularly at corners, jambs, and, where possible, at other locations.
- 23 B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not
- 24 use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- 25 C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly
- 26 with masonry around built-in items.
- 27 D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- 28 E. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire
- 29 mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- 30 F. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items
- 31 unless otherwise indicated.
- 32 **3.4 MORTAR BEDDING AND JOINTING**
- 33 A. Lay hollow CMUs as follows:
- 34 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
- 35 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
- 36 3. Bed webs in mortar in grouted masonry, including starting course on footings.
- 37 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not
- 38 grouted.
- 39 B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints
- 40 and shove into place. Do not deeply furrow bed joints or slush head joints.
- 41 C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless
- 42 otherwise indicated.
- 43 D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless
- 44 otherwise indicated.
- 45 **3.5 MASONRY-JOINT REINFORCEMENT**
- 46 A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior
- 47 side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
- 48 1. Space reinforcement not more than 16 inches o.c.
- 49 2. Provide reinforcement not more than 8 inches above and below wall openings and extending 12
- 50 inches beyond openings in addition to continuous reinforcement.
- 51 B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- 52 C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- 53 D. Provide continuity at corners by using prefabricated L-shaped units.
- 54

1 3.6 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- 2 A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete,
3 to comply with the following:
- 4 1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete
5 unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 - 6 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 - 7 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c.
8 horizontally.

9 3.7 FIELD QUALITY CONTROL

- 10 A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare
11 reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections.
12 Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- 13 B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.
- 14 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 15 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and
16 locations of reinforcement.
 - 17 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- 18 C. Testing Prior to Construction: One set of tests.
- 19 D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- 20 E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive
21 strength.
- 22 F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- 23 G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for
24 compressive strength.
- 25 H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

26 3.8 REPAIRING, POINTING, AND CLEANING

- 27 A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and
28 smears before tooling joints.
- 29 B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
- 30 1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison
31 purposes.
 - 32 2. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

33 3.9 MASONRY WASTE DISPOSAL

- 34 A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated
35 sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
- 36 1. Do not dispose of masonry waste as fill within 36 inches of finished grade.
- 37 B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- 38 C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described
39 above or recycled, and other masonry waste, and legally dispose of off Owner's property.

40 END OF SECTION

SECTION 04 42 00

EXTERIOR STONE CLADDING

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
- 1.2 SUMMARY
- 1.3 DEFINITIONS
- 1.4 PREINSTALLATION MEETINGS
- 1.5 ACTION SUBMITTALS
- 1.6 INFORMATIONAL SUBMITTALS
- 1.7 QUALITY ASSURANCE
- 1.8 DELIVERY, STORAGE, AND HANDLING
- 1.9 FIELD CONDITIONS
- 1.10 COORDINATION

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
- 2.2 PERFORMANCE REQUIREMENTS
- 2.3 LIMESTONE
- 2.4 GRANITE
- 2.5 ANCHORS AND FASTENERS
- 2.6 STONE FABRICATION
- ~~2.7 FABRICATION OF BACKUP STRUCTURE~~
- ~~2.8 SHOP PAINTED STEEL FINISHES~~
- 2.9 SOURCE QUALITY CONTROL

PART 3 - EXECUTION

- 3.1 EXAMINATION
- 3.2 SETTING DIMENSION STONE CLADDING, GENERAL
- 3.3 SETTING MECHANICALLY ANCHORED DIMENSION STONE CLADDING
- 3.4 INSTALLATION TOLERANCES
- 3.5 ADJUSTING AND CLEANING

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. Dimension stone panels set with individual anchors.
- B. Related Requirements:
 - 1. Section 03 30 00 "Cast-in-Place Concrete" for installing inserts and weld plates in concrete for anchoring dimension stone cladding.
 - 2. Section 04 20 00 "Unit Masonry" for installing inserts in unit masonry for anchoring dimension stone cladding.

1.3 DEFINITIONS

- A. Definitions contained in ASTM C 119 apply to this Section.
- B. Dimension Stone Cladding Assembly: An exterior wall covering system consisting of dimension stone panels together with anchors, secondary weather barrier (sheathing), fasteners, and sealants used to secure the stone to the building structure and to produce a weather-resistant covering.
- C. IBC: International Building Code.

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each variety of stone, stone accessory, and manufactured product.

- 1 B. Shop Drawings: Show fabrication and installation details for dimension stone cladding assembly, including
2 dimensions and profiles of stone units.
3 1. Show locations and details of joints both within dimension stone cladding assembly and between
4 dimension stone cladding assembly and other construction.
5 2. Show locations and details of anchors.
6 3. Show direction of veining, grain, or other directional pattern.
7 C. Stone Samples for Verification: Sets for each variety, color, and finish of stone required; not less than 12
8 inches square.
9 1. Sets shall consist of at least five Samples, exhibiting extremes of the full range of color and other
10 visual characteristics expected and will establish the standard by which stone will be judged.

11 **1.6 INFORMATIONAL SUBMITTALS**

- 12 A. Source quality-control reports.
- 13 **1.7 QUALIFICATION REQUIREMENTS**
- 14 A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate dimension stone cladding
15 assemblies similar to that required for this Project and whose products have a record of successful in-service
16 performance.
17 B. Installer Qualifications: A firm or individual experienced in installing dimension stone cladding assemblies
18 similar in material, design, and extent to that indicated for this Project, whose work has a record of successful
19 in-service performance.
20 C. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
21 D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural
22 Welding Code – Steel and AWS D1.3, "Structural Welding Code - Sheet Steel."
23 E. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic
24 effects and set quality standards for materials and execution.
25 1. Build mockups of typical exterior wall area.
26 a. Stone mockup shall be constructed approximately 7 feet W x 4 feet H, extent per G6/A-411.3,
27 with CMU and all components of wall assembly.
28 b. Include typical components, attachments to building structure, and methods of installation.
29 c. Include sealant-filled joint complying with requirements in Section 07 92 00 "Joint Sealants."
30 2. Approval of mockups does not constitute approval of deviations from the Contract Documents
31 contained in mockups unless Architect specifically approves such deviations in writing.
32 3. Subject to compliance with requirements, approved mockups may become part of the completed
33 Work if undisturbed at time of Substantial Completion.

34 **1.8 DELIVERY, STORAGE, AND HANDLING**

- 35 A. Store and handle stone and related materials to prevent deterioration or damage due to moisture,
36 temperature changes, contaminants, corrosion, breaking, chipping, and other causes.
37 1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone,
38 if required, using dollies with cushioned wood supports.
39 2. Store stone on wood skids or pallets with non-staining, waterproof covers. Arrange to distribute
40 weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.
41 B. Mark stone units, on surface that will be concealed after installation, with designations used on Shop
42 Drawings to identify individual stone units. Orient markings on vertical panels so that they are right side up
43 when units are installed.
44 C. Deliver sealants to Project site in original unopened containers labeled with manufacturer's name, product
45 name and designation, color, expiration period, pot life, curing time, and mixing instructions for
46 multicomponent materials.

47 **1.9 FIELD CONDITIONS**

- 48 A. Protect dimension stone cladding during erection by doing the following:
49 1. Cover tops of dimension stone cladding installation with nonstaining, waterproof sheeting at end of
50 each day's work. Cover partially completed structures when work is not in progress. Extend cover a
51 minimum of 24 inches down both sides and hold securely in place.
52 2. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and
53 over wall surface.

54 **1.10 COORDINATION**

- 55 A. Coordinate installation of inserts that are to be embedded in concrete or masonry, flashing reglets, and
56 similar items to be used by dimension stone cladding Installer for anchoring, supporting, and flashing of

- 1 dimension stone cladding assembly. Furnish setting drawings, templates, and directions for installing such
2 items and deliver to Project site in time for installation.
3 B. Time delivery and installation of dimension stone cladding to avoid extended on-site storage and to
4 coordinate with work adjacent to dimension stone cladding.

5 **PART 2 - PRODUCTS**

6 **2.1 MANUFACTURERS**

- 7 A. Source Limitations for Stone: Obtain stone, regardless of finish, from single quarry, whether specified in this
8 Section or in another Section of the Specifications, with resources to provide materials of consistent quality
9 in appearance and physical properties:
10 1. For stone types that include same list of varieties and sources, provide same variety from same
11 source for each.
12 2. Make quarried blocks available for examination by Architect.
13 B. Source Limitations for Other Materials: Obtain each type of stone accessory and other material from single
14 manufacturer for each product.

15 **2.2 PERFORMANCE REQUIREMENTS**

- 16 A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
17 1. Temperature Change: 120 deg F, ambient; 150 deg F, material surfaces.
18 B. Provisions for Fabrication and Erection Tolerances: Allow for fabrication and erection tolerances of building's
19 structural system. Concrete fabrication and erection tolerances are specified in Section 03 30 00 "Cast-in-
20 Place Concrete."

21 **2.3 LIMESTONE (LM-1)**

- 22 A. Material Standard: Comply with ASTM C 568.
23 1. Classification: II Medium-Density.
24 B. Description: Oolitic limestone.
25 C. Varieties and Sources: Indiana limestone quarried in Lawrence, Monroe, or Owen Counties, Indiana.
26 1. Indiana Limestone Grade and Color: Standard, buff, according to grade and color classification
27 established by ILI.
28 D. Cut: Vein and Fleuri as indicated or scheduled.
29 1. Orientation of Veining: As indicated.
30 E. Cut stone from one block or contiguous, matched blocks in which natural markings occur.
31 F. Finish: Smooth finish.
32 G. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.
33 H. Thickness: Not less than 1-1/2 inches unless otherwise indicated.

34 **2.4 GRANITE (GR-1)**

- 35 A. Granite Building Stone Standard: ASTM C 615
36 B. Association Standard: The National Building Granite Quarries Association's (NBGQA) "Specifications for
37 Architectural Granite."
38 C. Properties:
39 1. Absorption by Weight: 0.40 percent maximum, per ASTM C97.
40 2. Density: 160 lb per cu. ft. minimum, per ASTM C97.
41 3. Compressive Strength: 19,000 psi minimum, per ASTM C 170.
42 4. Modulus of Rupture: 1,500 psi minimum, as tested dry and perpendicular to grain per ASTM C 99.
43 5. Flexural or Bending Strength: 1200 psi minimum, as tested per ASTM C 880 modified.
44 6. Color: Exterior wall Base Facing: Absolute Black
45 7. Finish: Polished

46 **2.5 ANCHORS AND FASTENERS**

- 47 A. Fabricate anchors from stainless steel, ASTM A 240/A 240M or ASTM A 666, Type 316; temper as required
48 to support loads imposed without exceeding allowable design stresses. Fabricate dowels and pins for
49 anchors from stainless steel, ASTM A 276, Type 316.
50 1. Proprietary stone anchor shall be Halfen Body Anchor or approved equal. Strap Anchors shall be
51 acceptable.
52 B. Cast-in-Place Concrete Inserts: Either threaded or wedge type unless otherwise indicated; galvanized
53 ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel, with capability to
54 sustain, without failure, a load equal to 4 times the loads imposed as determined by testing per ASTM E

488, conducted by a qualified independent testing agency. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
Preinstalled Anchor Bolts for Concrete and Masonry: Torque-controlled expansion anchors, or undercut anchors made from stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 for bolts and nuts; ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304 or 316, for anchors, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed, for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

2.6 STONE FABRICATION

- A. General: Fabricate stone units in sizes and shapes required to comply with requirements indicated.
1. For limestone, comply with recommendations in ILI's "Indiana Limestone Handbook."
- B. Control depth of stone and back check to maintain minimum clearance of 1-1/2 inches between backs of stone units and surfaces or projections of structural members, fireproofing (if any), backup walls, and other work behind stone.
- C. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated. Shape beds to fit supports.
- D. Cut and drill sinkages and holes in stone for anchors, fasteners, supports, and lifting devices as indicated or needed to set stone securely in place.
- E. Finish exposed faces and edges of stone, to comply with requirements indicated for finish and to match approved samples and mockups.
- F. Quirk-miter corners unless otherwise indicated; provide for cramp anchorage in top and bottom bed joints of corner pieces.
- G. Cut stone to produce uniform joints [3/8 inch] [1/2 inch] <Insert dimension> wide and in locations indicated.
- H. Contiguous Work: Provide chases, reveals, reglets, openings, and similar features as required to accommodate contiguous work.
- I. Fabricate molded work, including washes and drips, to produce stone shapes with a uniform profile throughout entire unit length, with precisely formed arris slightly eased to prevent snipping, and with matching profile at joints between units.
1. Produce moldings and molded edges with machines that use abrasive shaping wheels made to reverse contour of molding shape.
- J. Clean backs of stone to remove rust stains, iron particles, and stone dust.
- K. Inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.
1. Grade and mark stone for overall uniform appearance when assembled in place. Natural variations in appearance are acceptable if installed stone units match range of colors and other appearance characteristics represented in approved samples and mockups.

2.7 FABRICATION OF BACKUP STRUCTURE

- A. Fabrication of Steel Stud Frames: Fabricate and assemble by welding to comply with requirements in Section 05-40-00 "Cold-Formed Metal Framing."
1. Weld secondary weather barrier (sheathing) to outside face of steel stud frames. Use continuous welds at all four edges of sheets to provide continuous weather seal.
 2. Clean welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

2.8 SHOP PAINTED STEEL FINISHES

- A. General: Paint uncoated steel backup structure before delivering to Project site to comply with SSPC PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel."
- B. Surface Preparation: After fabricating steel items, prepare surfaces to comply with SSPC SP 6/NACE No. 3, "Commercial Blast Cleaning."
- C. Apply one coat of fast curing, lead and chromate free, universal modified alkyd primer complying with MPI#76. [After primer has dried, apply one coat of exterior alkyd enamel complying with MPI#96 of a different color than primer.]
- D. Apply two coat, high performance coating system consisting of epoxy zinc-rich primer, complying with MPI#20 and topcoat of high build epoxy coating, complying with MPI#108.

1 **2.92.7 SOURCE QUALITY CONTROL**

- 2 A. Testing Agency: Engage a qualified testing agency to perform source quality-control testing.
3 1. Furnish test specimens randomly selected from same blocks as actual materials proposed for
4 incorporation into the Work.
5 2. Flexural Strength Tests: ASTM C 880/C 880M, performed on specimens of same thickness,
6 orientation of cut, and finish as installed stone. One set of test specimens is required to be tested for
7 every 10,000 sq. ft., but not fewer than two sets for each stone variety.

8 **PART 3 - EXECUTION**

9 **3.1 EXAMINATION**

- 10 A. Examine surfaces to receive dimension stone cladding and conditions under which dimension stone cladding
11 will be installed, with Installer present, for compliance with requirements for installation tolerances and other
12 conditions affecting performance of dimension stone cladding.
13 B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of dimension
14 stone cladding.
15 C. Proceed with installation only after unsatisfactory conditions have been corrected.

16 **3.2 SETTING DIMENSION STONE CLADDING, GENERAL**

- 17 A. Before setting stone, clean surfaces that are dirty or stained by removing soil, stains, and foreign materials.
18 Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild
19 cleaning compounds that contain no caustic or harsh materials or abrasives.
20 B. Coat limestone with dampproofing to extent indicated below:
21 1. Stone at Grade: Beds, joints, and back surfaces to at least 12 inches above finish-grade elevations.
22 2. Stone Extending Below Grade: Beds, joints, back surfaces, and face surfaces below grade.
23 3. Allow dampproofing to cure before setting dampproofed stone. Do not damage or remove
24 dampproofing while handling and setting stone.
25 C. Execute dimension stone cladding installation by skilled mechanics and employ skilled stone fitters at Project
26 site to do necessary field cutting as stone is set.
27 1. Use power saws with diamond blades to cut stone. Produce lines cut straight and true, with edges
28 eased slightly to prevent snipping.
29 D. Contiguous Work: Provide reveals, reglets, and openings as required to accommodate contiguous work.
30 E. Set stone to comply with requirements indicated. Install anchors, supports, fasteners, and other attachments
31 indicated or necessary to secure dimension stone cladding in place. Shim and adjust anchors, supports, and
32 accessories to set stone accurately in locations indicated, with uniform joints of widths indicated, and with
33 edges and faces aligned according to established relationships and indicated tolerances.
34 F. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
35 1. Sealing expansion and other joints is specified in Section 07 92 00 "Joint Sealants."
36 G. Keep cavities open where unfilled space is indicated between back of stone units and backup wall; do not
37 fill cavities with mortar or grout.

38 **3.3 SETTING MECHANICALLY ANCHORED DIMENSION STONE CLADDING**

- 39 A. Set dimension stone cladding with mechanical anchors without mortar unless otherwise indicated.
40 B. Attach anchors securely to stone and to backup surfaces. Comply with recommendations in ASTM C 1242.
41 C. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels
42 and anchor tabs on stone. Fill remainder of anchor holes and kerfs with sealant indicated for filling kerfs.
43 D. Set stone supported on clips or continuous angles on resilient setting shims. Use material of thickness
44 required to maintain uniform joint widths and to prevent point loading of stone on anchors. Hold shims back
45 from face of stone a distance at least equal to width of joint.

46 **3.4 INSTALLATION TOLERANCES**

- 47 A. Variation from Plumb: For vertical lines and surfaces of walls, do not exceed 1/4 inch in 10 feet, 3/8 inch in
48 20 feet, or 1/2 inch in 40 feet or more. For external corners, corners and jambs within 20 feet of an entrance,
49 expansion joints, and other conspicuous lines, do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8
50 inch in 40 feet or more.
51 B. Variation from Level: For lintels, sills, water tables, parapets, horizontal bands, horizontal grooves, and other
52 conspicuous lines, do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.
53 C. Variation of Linear Building Line: For positions shown in plan and related portions of walls and partitions, do
54 not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.

- 1 D. Variation in Cross-Sectional Dimensions: For thickness of walls from dimensions indicated, do not exceed
2 plus or minus 1/4 inch.
3 E. Variation in Joint Width: Do not vary from average joint width more than plus or minus 1/8 inch or a quarter
4 of nominal joint width, whichever is less. For joints within 60 inches of each other, do not vary more than 1/8
5 inch or a quarter of nominal joint width, whichever is less from one to the other.
6 F. Variation in Plane between Adjacent Stone Units (Lipping): Do not exceed 1/16-inch difference between
7 planes of adjacent units.

8 **ADJUSTING AND CLEANING**

- 9 A. Remove and replace broken, chipped, stained, or otherwise damaged stone, defective joints, and dimension
10 stone cladding that does not match approved samples [and mockups]. Damaged stone may be repaired if
11 Architect approves methods and results.
12 B. Replace damaged or defective work in a manner that results in dimension stone cladding's matching
13 approved samples [and mockups], complying with other requirements, and showing no evidence of
14 replacement.
15 C. In-Progress Cleaning: Clean dimension stone cladding as work progresses. Remove excess sealant and
16 smears as sealant is installed.
17 D. Final Cleaning: Clean dimension stone cladding no fewer than six days after completion of pointing and
18 sealing, using clean water and stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents,
19 cleaning agents containing caustic compounds or abrasives, or other materials or methods that could
20 damage stone.

21 **END OF SECTION 04 42 00**

SECTION 05 40 00

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
- 1.2 SUMMARY
- 1.3 PERFORMANCE REQUIREMENTS
- 1.4 SUBMITTALS
- 1.5 QUALITY ASSURANCE
- 1.6 DELIVERY, STORAGE, AND HANDLING

PART 2 - PRODUCTS

- 2.1 MATERIALS
- 2.2 EXTERIOR NON-LOAD-BEARING WALL FRAMING
- 2.3 FRAMING ACCESSORIES
- 2.4 ANCHORS, CLIPS, AND FASTENERS
- 2.5 MISCELLANEOUS MATERIALS
- 2.6 FABRICATION

PART 3 - EXECUTION

- 3.1 EXAMINATION
- 3.2 PREPARATION
- 3.3 INSTALLATION, GENERAL
- 3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION
- 3.5 FIELD QUALITY CONTROL
- 3.6 REPAIRS AND PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior non-load-bearing wall framing)
- B. Related Sections include the following:
 - 1. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated on drawings.
 - 2. Deflection Limits: Design framing systems to withstand design loads (UNO) without deflections greater than the following:
 - a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height.
 - 3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F
 - 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of 3/4 inch, or as indicated.
- B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."
 - 1. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing - Header Design."
 - 2. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

- 1 1.4 SUBMITTALS
- 2 A. Product Data: For each type of cold-formed metal framing product and accessory indicated.
- 3 B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing;
- 4 fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing
- 5 channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories,
- 6 connection details, and attachment to adjoining work.
- 7 1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data
- 8 signed and sealed by the qualified professional engineer licensed in the state of Wisconsin
- 9 responsible for their preparation.
- 10 C. Welding certificates.
- 11 D. Calculations: For cold-formed metal framing indicated to comply with design loads, include structural
- 12 analysis data signed and sealed by Qualified Professional Engineer responsible for their preparation.
- 13 1. Steel sheet.
- 14 2. Expansion anchors.
- 15 3. Cold-formed metal fasteners.
- 16 4. Vertical deflection clips.
- 17 5. Horizontal drift deflection clips.
- 18 6. Miscellaneous structural clips and accessories.
- 19
- 20 1.5 QUALITY ASSURANCE
- 21 A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data
- 22 by a qualified professional engineer.
- 23 B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in
- 24 jurisdiction where Project is located and who is experienced in providing engineering services of the kind
- 25 indicated. Engineering services are defined as those performed for installations of cold-formed metal
- 26 framing that are similar to those indicated for this Project in material, design, and extent.
- 27 C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--
- 28 Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- 29 D. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-
- 30 Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
- 31 1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."
- 32 1.6 DELIVERY, STORAGE, AND HANDLING
- 33 A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage,
- 34 and handling.
- 35 B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

36 **PART 2 - PRODUCTS**

- 37 2.1 MATERIALS
- 38 A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating
- 39 weight as follows:
- 40 1. Grade: As required by structural performance,
- 41 2. Coating: G60
- 42 B. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and
- 43 coating as follows:
- 44 1. Grade: As required by structural performance.
- 45 2. Coating: G90.
- 46 2.2 EXTERIOR NON-LOAD-BEARING WALL FRAMING
- 47 A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with
- 48 stiffened flanges, and as follows:
- 49 1. Minimum Base-Metal Thickness: 18-gage.
- 50 2. Flange Width: 1-5/8 inches, min..
- 51 3. Section Properties: As required by design.
- 52 B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with
- 53 unstiffened flanges, and as follows:
- 54 1. Minimum Base-Metal Thickness: Matching steel studs.
- 55 2. Flange Width: 1-1/4 inches, min.

- 1 **2.3 FRAMING ACCESSORIES**
- 2 A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H,
3 metallic coated, of same grade and coating weight used for framing members.
- 4 B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as
5 follows:
- 6 **2.4 ANCHORS, CLIPS, AND FASTENERS**
- 7 A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to
8 ASTM A 123/A 123M.
- 9 B. Anchor Bolts: As required by design; zinc coated.
- 10 C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure,
11 a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified
12 independent testing agency.
- 13 D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from
14 corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load,
15 as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- 16 E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill
17 screws.
- 18 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- 19 F. Welding Electrodes: Comply with AWS standards.
- 20 **2.5 MISCELLANEOUS MATERIALS**
- 21 A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.
- 22 B. Shims: Load bearing, high-density multi-monomer plastic, non-leaching.
- 23 C. Sealer Gaskets: Closed-cell neoprene foam, 3/8 inch thick, peel-and-stick "Tee" shaped selected from
24 manufacturer's standard widths to match width of bottom track or rim track members.
- 25 1. Acceptable products include Triple Guard Energy Sill Sealer as manufactured by Protecto Wrap
26 Company
- 27 2. Primers & Accessories:
- 28 a. Protecto-Tak Spray Primer.
- 29 b. No. 100 Primer.
- 30 **2.6 FABRICATION**
- 31 A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections
32 securely fastened, according to referenced AISI's specifications and standards, manufacturer's written
33 instructions, and requirements in this Section.
- 34 1. Fabricate framing assemblies using jigs or templates.
- 35 2. Cut framing members by sawing or shearing; do not torch cut.
- 36 3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting
37 as standard with fabricator. Wire tying of framing members is not permitted.
- 38 a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of
39 welds, and methods used in correcting welding work.
- 40 b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating
41 joined members by not less than three exposed screw threads.
- 42 4. Fasten other materials to cold-formed metal framing by welding, bolting; or screw fastening,
43 according to Shop Drawings.
- 44 B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift
45 fabricated assemblies to prevent damage or permanent distortion.
- 46 C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable
47 tolerance variation of 1/8 inch in 10 feet and as follows:
- 48 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location.
49 Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing
50 materials.
- 51 2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square
52 tolerance of 1/8 inch.
- 53

- 1 PART 3 - EXECUTION
- 2 3.1 EXAMINATION.
- 3 A. Examine supporting substrates and abutting structural framing for compliance with requirements for
- 4 installation tolerances and other conditions affecting performance.
- 5 1. Proceed with installation only after unsatisfactory conditions have been corrected.
- 6 3.2 PREPARATION
- 7 A. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of
- 8 foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete
- 9 or masonry construction.
- 10 B. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall
- 11 or slab at stud or joist locations.
- 12 3.3 INSTALLATION, GENERAL
- 13 A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
- 14 B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General
- 15 Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- 16 C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
- 17 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-
- 18 line joints with maximum variation in plane and true position between fabricated panels not exceeding
- 19 1/16 inch.
- 20 D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections
- 21 securely fastened.
- 22 1. Cut framing members by sawing or shearing; do not torch cut.
- 23 2. Fasten cold-formed metal framing members by welding, clinch fastening, or riveting.
- 24 Wire tying of framing members is not permitted.
- 25 a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of
- 26 welds, and methods used in correcting welding work.
- 27 b. Locate mechanical fasteners and install according to Shop Drawings, and complying with
- 28 requirements for spacing, edge distances, and screw penetration.
- 29 E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension
- 30 members.
- 31 F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those
- 32 for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated
- 33 supporting structure has been completed and permanent connections to framing are secured.
- 34 G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame
- 35 both sides of joints.
- 36 H. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable
- 37 tolerance variation of 1/8 inch in 10 feet and as follows:
- 38 1. Space individual framing members no more than plus or minus 1/8 inch from plan location.
- 39 Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing
- 40 materials.
- 41 3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION
- 42 A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting
- 43 structure as indicated.
- 44 B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:
- 45 1. Stud Spacing: As required by design, 16" maximum.
- 46 C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces
- 47 and similar requirements.
- 48 D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while
- 49 providing lateral support.
- 50

- 1 E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48
2 inches apart. Fasten at each stud intersection.
3 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single
4 deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated
5 and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to
6 stud flanges and secure solid blocking to stud webs or flanges.
7 a. Install solid blocking at centers indicated on Shop Drawings.
8 2. Bridging (option): Cold-rolled steel channel, welded or mechanically fastened to webs of punched
9 studs.
10 3. Bridging (option): Proprietary bridging bars installed according to manufacturer's written instructions.
11 F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous
12 angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.
13 G. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-
14 formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written
15 instructions.
16 H. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that
17 ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.
18

END OF SECTION 05 40 00

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28 JULY 2017

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ISSUED FOR ADDENDUM #2
JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE
CONTRACT # 7952 MUNIS # 11471

SECTION 05 50 00
METAL FABRICATIONS

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37 PART 1 - GENERAL

- 38 1.1 SUMMARY
39 A. Section Includes:
40 1. Metal fabrications
41 a. Miscellaneous steel framing and supports.
42 b. Miscellaneous steel trim.
43 c. Grating.
44 d. Metal bollards. (Except as supplied with parking equipment)
45 e. Public parking - steel sign posts.
46 f. Elevator machine beams, hoist beams, and divider beams.
47 g. Elevator pit ladder.
48 h. Ships ladders.
49 i. Aluminum tube frames.
50 j. Vault access hatch
51 ~~2. Madison Fire Department KNOX Box.~~
52 B. Products furnished, but not installed, under this Section include the following:
53 1. Loose steel lintels.
54 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast
55 into concrete or built into unit masonry.
56

- 1 1.2 COORDINATION
- 2 A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating
- 3 manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one
- 4 another.
- 5 B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting
- 6 drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor
- 7 bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items
- 8 to Project site in time for installation.
- 9 1.3 ACTION SUBMITTALS
- 10 A. Product Data: For the following:
- 11 1. Paint products.
- 12 2. Grout.
- 13 B. Sustainable Design Submittals:
- 14 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and
- 15 cost.
- 16 C. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of
- 17 metal fabrications and their connections. Show anchorage and accessory items.
- 18 D. Samples for Verification: For each type and finish of extruded nosing and tread.
- 19 E. Delegated-Design Submittal: For ladders, including analysis data signed and sealed by the qualified
- 20 professional engineer licensed in Wisconsin responsible for their preparation.
- 21 1.4 INFORMATIONAL SUBMITTALS
- 22 A. Qualification Data: For professional engineer.
- 23 B. Mill Certificates: Signed by stainless-steel manufacturers, certifying that products furnished comply with
- 24 requirements.
- 25 C. Welding certificates.
- 26 D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that
- 27 shop primers are compatible with topcoats.
- 28 E. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.
- 29 1.5 QUALITY ASSURANCE
- 30 A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural
- 31 Welding Code - Steel."
- 32 B. Welding Qualifications: Qualify procedures and personnel according to the following:
- 33 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- 34 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
- 35 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."
- 36 1.6 FIELD CONDITIONS
- 37 A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal
- 38 fabrications by field measurements before fabrication.

39 **PART 2 - PRODUCTS**

- 40 2.1 PERFORMANCE REQUIREMENTS
- 41 A. Delegated Design: Engage a qualified professional engineer licensed in the State of Wisconsin, as defined
- 42 in Section 01 40 00 "Quality Requirements," to design ladders.
- 43 B. Structural Performance of Aluminum Ladders: Aluminum ladders shall withstand the effects of loads and
- 44 stresses within limits and under conditions specified in ANSI A14.3.
- 45 C. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following
- 46 loads and stresses within limits and under conditions indicated:
- 47 1. Uniform Load: 100 lbf/sq. ft.
- 48 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.
- 49 3. Uniform and concentrated loads need not be assumed to act concurrently.
- 50 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads
- 51 specified above.
- 52 5. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.
- 53

- 1 D. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following
2 loads and stresses within limits and under conditions indicated:
3 1. Handrails and Top Rails of Guards:
4 a. Uniform load of 50 lbf/ft. applied in any direction.
5 b. Concentrated load of 200 lbf applied in any direction.
6 c. Uniform and concentrated loads need not be assumed to act concurrently.
7 2. Infill of Guards:
8 a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
9 b. Infill load and other loads need not be assumed to act concurrently.
10 E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting
11 on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure
12 of connections, and other detrimental effects.
13 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- 14 **2.2 METALS**
15 A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal
16 fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks,
17 rolled trade names, or blemishes.
18 B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled
19 content not less than 25 percent.
20 C. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
21 D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 316L.
22 E. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
23 F. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- 24 **2.3 FASTENERS**
25 A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-
26 plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls.
27 Select fasteners for type, grade, and class required.
28 1. Provide stainless-steel fasteners for fastening aluminum.
29 2. Provide stainless-steel fasteners for fastening stainless steel.
30 B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated;
31 galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel.
32 Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
33 C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
34 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or
35 ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
36 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 stainless-steel
37 bolts, ASTM F 593, and nuts, ASTM F 594.
38 D. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-
39 4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more
40 than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-
41 plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.
- 42 **2.4 MISCELLANEOUS MATERIALS**
43 A. Shop Primers (Exposed to view locations): Provide primers that comply with Section 09 91 23 "Interior
44 Painting".
45 B. Water-Based Primer (Interior concealed locations): Emulsion type, anticorrosive primer for mildly corrosive
46 environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and
47 compatible with topcoat.
48 C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with
49 paints specified to be used over it.
50 D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
51 E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying
52 with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and
53 exterior applications.
54 F. Concrete for steel bollards, bollard footings: Comply with requirements in Section 03 30 00 "Cast-in-Place
55 Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000
56 psi.
57

- 1 2.5 FABRICATION, GENERAL
- 2 A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain
- 3 structural value of joined pieces.
- 4 B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough
- 5 areas on exposed surfaces.
- 6 C. Weld corners and seams continuously to comply with the following:
- 7 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance
- 8 of base metals.
- 9 2. Obtain fusion without undercut or overlap.
- 10 3. Remove welding flux immediately.
- 11 4. At exposed connections, finish exposed welds and surfaces smooth and blended.
- 12 D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where
- 13 possible. Locate joints where least conspicuous.
- 14 E. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide
- 15 weep holes where water may accumulate.
- 16 F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel
- 17 strap anchors not less than 8 inches from ends and corners of units and 24 inches o.c.
- 18 2.6 MISCELLANEOUS FRAMING AND SUPPORTS
- 19 A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- 20 B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated.
- 21 Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
- 22 2.7 MISCELLANEOUS STEEL TRIM
- 23 A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with
- 24 continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where
- 25 possible.
- 26 B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
- 27 2.8 GRATING
- 28 A. Pressure-Locked Steel Grating: Fabricated by pressing rectangular flush-top crossbars into slotted bearing
- 29 bars or swaging crossbars between bearing bars.
- 30 1. Areaway On The West Wall:
- 31 a. 1-1/4 inches x 1/8 inch (32 mm by 3 mm) bearing bars at 1-3/16 inches spacing.
- 32 b. Design Free Area: 84% free area. Minimum Free Area Required: 60%.
- 33 c. Crossbar Spacing: 4 inches (102 mm) o.c.
- 34 d. Surface: Plain.
- 35 e. Perimeter Plate: 1/4 inch (6 mm).
- 36 f. Steel Finish: Hot-dip galvanized with a coating weight of not less than 1.8 oz./sq. ft. (550
- 37 g/sq. m) of coated surface.
- 38 g. Bearing Shelf Angle: 3 inches x height of grating.
- 39 B. Welded Steel Grating:
- 40 1. Transformer Vault:
- 41 a. Manufacturer: Hughes and Brothers as required by MG&E.
- 42 b. Refer to Drawing and Details.
- 43 2.9 METAL BOLLARDS
- 44 A. Fabricate metal bollards from Schedule 40 steel pipe
- 45 1. Cap bollards with 1/4-inch-thick steel plate.
- 46 B. Fabricate bollards with 3/8-inch-thick steel baseplates for bolting to concrete slab. Drill baseplates at all four
- 47 corners for 3/4-inch anchor bolts.
- 48 C. Fabricate sleeves for bollard anchorage from steel pipe or tubing with 1/4-inch-thick steel plate welded to
- 49 bottom of sleeve.
- 50 D. Prime bollards with zinc-rich primer.
- 51

- 1 **2.10 PIPE OR DOWNSPOUT GUARDS**
- 2 A. Fabricate pipe and downspout guards from 3/8-inch-thick by 12-inch-wide steel plate, bent to fit flat against
- 3 the wall or column at both ends and to fit around pipe with 2-inch clearance between pipe and pipe guard.
- 4 Drill each end for two 3/4-inch anchor bolts.
- 5 B. Galvanize pipe and downspout guards.
- 6 **2.11 METAL SHIPS' LADDERS**
- 7 A. Provide metal ships' ladders where indicated. Fabricate of open-type construction with channel or plate
- 8 stringers and pipe and tube railings unless otherwise indicated. Provide brackets and fittings for installation.
- 9 1. Treads shall be not less than 5 inches exclusive of nosing or less than 8-1/2 inches including the
- 10 nosing, and riser height shall be not more than 9-1/2 inches.
- 11 2. Fabricate ships' ladders, including railings from steel.
- 12 3. Fabricate treads from welded or pressure-locked steel bar grating. Limit openings in gratings to no
- 13 more than 1/2 inch in least dimension.
- 14 4. Fabricate treads from abrasive-surface floor plate.
- 15 5. Comply with applicable railing requirements in Section 055213 "Pipe and Tube Railings."
- 16 B. Galvanize steel ships' ladders, including treads, railings, brackets, and fasteners.
- 17 **2.12 ALUMINUM TUBE FRAMES**
- 18 A. Design: Picture framing and structural support of various exterior elements as indicated
- 19 B. Aluminum Tube Frames: Fabricate railings to comply with requirements indicated for design, dimensions,
- 20 details, finish, and member sizes, including wall thickness of tube, and anchorage, but not less than that
- 21 needed to withstand indicated loads. Refer to Drawings (A300)
- 22 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
- 23 a. Sheet and Plate: ASTM B 209.
- 24 b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
- 25 c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
- 26 d. Structural Profiles: ASTM B 308/B 308M.
- 27 2. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining,
- 28 nonferrous shims for aligning system components.
- 29 3. Finish: Flucropolymer resin based two coat finish containing 70% "Kynar 500" resin to match PPG
- 30 Duramar Sunstorm Pewter.
- 31 **2.13 VAULT ACCESS DOOR**
- 32 A. Product: Bilco J-AL Channel Frame – AASHTO H-20 Heavy Duty Access Door.
- 33 B. Finish: Mill.
- 34 C. Hinges and Hardware: Stainless steel type 316 – standard.
- 35 **2.14 ABRASIVE METAL STAIR NOSINGS**
- 36 A. Cast-Metal Units: Cast iron, with an integral-abrasive, as-cast finish consisting of aluminum oxide, silicon
- 37 carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or
- 38 conditions:
- 39 1. Manufacturers:
- 40 a. American Safety Tread Company
- 41 b. Balco, Inc
- 42 c. Barry Pattern and Foundry Company
- 43 d. Safe-T-Metal Company, Inc.
- 44 2. Nosings: Two-piece units, 3 inches wide, with subchannel for casting into concrete steps.
- 45 B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with
- 46 manufacturer.
- 47 C. Apply bituminous paint to concealed surfaces of cast-metal units.
- 48

- 1 2.15 COUNTER SUPPORTS
2 A. Counter Support Brackets: Rakks counter support brackets, clear anodized aluminum by Rangine Corp.,
3 Needham, MA, as follows:
4 1. Anodized aluminum face plates with adhesive backing, Model No. EHFP-0202.
5 2. Bracket Model No. EH-1818, for countertops up to 25-inch depth, 18" x 18", 450-pound capacity,
6 surface-mounted.
7 3. Bracket Model No. EH-1824, for countertops up to 30-inch depth, 18" x 24", 450-pound capacity,
8 surface-mounted.
9 4. Bracket Model No. EH-1818-FM, for countertops up to 25-inch depth, 18" x 20", 300-pound capacity,
10 flush-mounted for countertops.
11 5. Bracket Model No. EH-1824-FM, for countertops up to 30-inch depth, 18" x 26", 300-pound capacity,
12 flush-mounted for countertops.
13 6. Bracket Model No. EH-1212, for shelf supports
- 14 2.16 LOOSE BEARING AND LEVELING PLATES
15 A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill
16 plates to receive anchor bolts and for grouting.
- 17 2.17 STEEL WELD PLATES AND ANGLES
18 A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete
19 construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded
20 steel strap anchors for embedding in concrete.
- 21 2.18 FINISHES, GENERAL
22 A. Finish metal fabrications after assembly.
- 23 2.19 STEEL AND IRON FINISHES
24 A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron
25 hardware and with ASTM A 123/A 123M for other steel and iron products.
26 B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete,
27 sprayed-on fireproofing, or masonry, or unless otherwise indicated.
28 C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
29 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
30 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
31 3. Other Items: SSPC-SP 3, "Power Tool Cleaning."

32 PART 3 - EXECUTION

- 33 3.1 INSTALLATION, GENERAL
34 A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications.
35 Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb,
36 true, and free of rack; and measured from established lines and levels.
37 B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left
38 as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or
39 abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or
40 screwed field connections.
41 C. Field Welding: Comply with the following requirements:
42 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance
43 of base metals.
44 2. Obtain fusion without undercut or overlap.
45 3. Remove welding flux immediately.
46 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness
47 shows after finishing and contour of welded surface matches that of adjacent surface.
48 D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are
49 required to be fastened to in-place construction.
50 E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or
51 similar construction.
- 52 3.2 INSTALLING PIPE GUARDS

- 1 A. Provide pipe guards at exposed vertical pipes in parking garage where not protected by curbs or other
2 barriers. Install by bolting to wall or column with expansion anchors. Provide four 3/4-inch bolts at each pipe
3 guard. Mount pipe guards with top edge 26 inches above driving surface.
- 4 **3.3 INSTALLING STAIR NOSINGS**
- 5 A. Install stair nosing on tread two-piece insert.
- 6 B. Two piece nosings embedded in concrete steps or curbs, align insert nosings flush with riser faces and level
7 with tread surfaces.
- 8 **3.4 INSTALLING METAL BOLLARDS**
- 9 A. Anchor control bollards as indicated on the drawings.
- 10 B. Fill bollards solidly with concrete, mounding top surface to shed water.
- 11 **3.5 INSTALLING BEARING AND LEVELING PLATES**
- 12 A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to
13 surfaces. Clean bottom surface of plates.
- 14 B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been
15 positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush
16 with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces
17 and plates to ensure that no voids remain.
- 18 **3.6 ADJUSTING AND CLEANING**
- 19 A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas.
20 Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-
21 PA 1 for touching up shop-painted surfaces.
- 22 B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to
23 comply with ASTM A 780/A 780M.
- 24

END OF SECTION

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28 JULY 2017

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ISSUED FOR ADDENDUM #2
JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE
CONTRACT # 7952 MUNIS # 11471

SECTION 06 16 00

SHEATHING

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
- 1.2 SUMMARY
- 1.3 SUBMITTALS
- 1.4 DELIVERY, STORAGE, AND HANDLING

PART 2 - PRODUCTS

- 2.1 WALL SHEATHING
- 2.2 FASTENERS
- 2.3 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS
- 2.4 MISCELLANEOUS MATERIALS

PART 3 - EXECUTION

- 3.1 INSTALLATION, GENERAL
- 3.2 GYPSUM SHEATHING INSTALLATION
- 3.3 SHEATHING JOINT-AND-PENETRATION TREATMENT
- 3.4 FLEXIBLE FLASHING INSTALLATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior gypsum sheathing.
 - 2. Sheathing joint-and-penetration treatment.
 - 3. Flexible flashing at openings in sheathing.
- B. Related Sections include the following:
 - 1. Division 05 Section "Cold-formed Metal Framing" for framework supporting sheathing.
 - 2. Division 06 Section "Bituminous Self-Adhering Sheet Air Barriers" for air barriers applied to sheathing.

1.3 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WALL SHEATHING

- A. Glass-Mat Gypsum Wall Sheathing:
 - 1. ASTM C 1177/1177M.
 - 2. Product: Subject to compliance with requirements, provide "Dens-Glass Gold" by G-P Gypsum Corporation or equal.
 - 3. Type and Thickness: Type X, 5/8 inch thick.
 - 4. Size: 48 by 108 inches for vertical installation.

2.2 FASTENERS

- A. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
1. For steel framing less than 0.0329 inch thick, attach sheathing to comply with ASTM C 1002.
 2. For steel framing from 0.033 to 0.112 inch thick, attach sheathing to comply with ASTM C 954.

2.3 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sheathing Tape for Glass-Mat Gypsum Sheathing Board: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing board and with a history of successful in-service use.

2.4 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a primed, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
 - b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Plus Self-Adhered Flashing and Vycor V40 Weather Barrier Strips.
 - c. Protecto Wrap Company; BT-20 XL and PS-45.
- B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

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.
- 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. NES NER-272 for power-driven fasteners.
 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
- D. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- E. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
1. Fasten gypsum sheathing to cold-formed metal framing with screws.
 2. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
 3. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.
- C. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

3.3 SHEATHING JOINT-AND-PENETRATION TREATMENT

1. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

1 3.4 FLEXIBLE FLASHING INSTALLATION

2 A. Apply flexible flashing where indicated to comply with manufacturers written instructions.

3 1. Prime substrates as recommended by flashing manufacturer.

4 2. Lap seams and junctures with other materials at least 4 inches , except that at flashing flanges of
5 other construction, laps need not exceed flange width.

6 3. Lap flashing over weather-resistant building paper at bottom and sides of openings.

7 4. Lap weather-resistant building paper over flashing at heads of openings.

8 5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing
9 is completely adhered to substrates.

10 END OF SECTION 06 16 00

LOTHAN VAN HOOK DESTEFANO AND ARCHITECTS LLC
28 JULY 2017

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- 1 E. Maintain work area in a neat and orderly condition, removing empty containers, rags, and rubbish
2 daily from the site.
3
4 **1.3 PRODUCT DELIVERY, STORAGE AND HANDLING**
5 A. Deliver materials to project site in original, factory-sealed, unopened containers bearing
6 manufacturer's name and label intact and legible with the following information.
7 1. Name of material
8 2. Manufacturer's stock number and date of manufacture
9 3. Material safety data sheet
10 B. Store membrane and accessory products in a protected area out of direct sunlight and between
11 40°F and 100°F. Protect from rain, physical damage and construction traffic.

12 **PART 2 - PRODUCTS**

13 **2.1 GENERAL**

- 14 A. Provide products manufactured and supplied by Carlisle Coatings & Waterproofing Inc, 900 Hensley
15 Lane, Wylie Texas 75098, phone (800) 527-7098, fax (972) 442-0076.
16 B. The components of this Blindsight System are to be products of Carlisle Coatings & Waterproofing Inc. The
17 installation, performance or integrity of products by others is not the responsibility of Carlisle Coatings &
18 Waterproofing Inc and is expressly disclaimed by the warranty.

19 **2.2 MEMBRANE**

- 20 A. MiraPLY-H Sheet Membrane: Shall be CCW-MiraPLY-H self-adhering adhesive coated membrane,
21 and shall meet or exceed the requirements listed in charts found on Technical Data Sheet.
22 B. MiraPLY-V Sheet Membrane: Shall be CCW-MiraPLY-V self-adhering adhesive coated membrane,
23 and shall meet or exceed the requirements listed in charts found in section 2.

24 **2.3 MIRAPLY-H RELATED ACCESSORY PRODUCTS**

- 25 A. Seam Tape: MiraPLY Seam Tape, MiraPLY Seam Tape LT or SecurTAPE – 6" wide
26 B. Detailing Tapes: Shall be:
27 1. MiraPLY Detail Tape – 6" wide
28 2. P/S Elastoform Flashing
29 C. Primers:
30 1. Low VOC Primer
31 2. HP-250 Primer
32 3. CAV-GRIP
33 D. Termination Sealant:
34 1. Sure-Seal Lap Sealant
35 2. Universal Single Ply Sealant
36 E. Detail Sealants:
37 1. Sure-Seal Lap Sealant
38 2. Universal Single Ply Sealant
39 3. DOW 758
40 F. 2-Part Liquid Membrane: CCW-703V LiquiSeal
41 G. Reinforcing Fabric:
42 1. CCW-LiquiFiber-6", 12" wide
43 H. Termination Bar: Sure-Seal Termination Bar
44 I. Water Stop: CCW MiraSTOP
45 J. Backer Rod: Closed-cell polyethylene foam rod
46 K. Expansion joints: EJ-500
47 L. Drain Composite: CCW MiraDRAIN Drainage Composite as selected per project
48 M. Perimeter Drainage System: Where required, shall be CCW MiraDRAIN HC
49 N. Cleaner: Weathered Membrane Cleaner or approved equal

50 **2.4 MIRAPLY-V RELATED ACCESSORY PRODUCTS**

- 51 A. Seam Tape: Shall be SecurTAPE – 6" wide
52 B. Detailing Tapes: Shall be:
53 1. CCW-Detail Tape – 2", 6" wide
54 2. P/S Elastoform Flashing

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BLINDSIDE SELF-ADHERING SHEET
WATERPROOFING

- 1 C. Primers shall be:
- 2 1. Low VOC Primer
- 3 2. HP-250 Primer
- 4 D. Termination Sealant:
- 5 1. Sure-Seal Lap Sealant
- 6 E. Detail Sealants:
- 7 1. Sure-Seal Lap Sealant
- 8 2. Universal Single Ply Sealant
- 9 F. 2-Part Liquid Membrane: CCW-703V LiquiSeal
- 10 G. Reinforcing Fabric:
- 11 1. CCW-LiquiFiber – 6", 12" wide
- 12 H. Termination Bar: Shall be Sure-Seal Termination Bar
- 13 I. Water Stop: CCW MiraSTOP
- 14 J. Backer Rod: Closed-cell polyethylene foam rod
- 15 K. Expansion joints: EJ-500
- 16 L. Drain Composite: CCW MiraDRAIN Drainage Composite as selected per project
- 17 M. Perimeter Drainage System: Where required, shall be CCW MiraDRAIN HC
- 18 N. Cleaner: Weathered Membrane Cleaner or approved equal
- 19 O. Reinforcing Membrane/Flashing: Sure-Seal P/S Elastoform Flashing

20 2.5 CARLISLE BLINDSIDE PHYSICAL PROPERTIES MIRAPLY-H

- 21 A. Please refer to Technical Data Sheet.

22 2.6 CARLISLE BLINDSIDE PHYSICAL PROPERTIES MIRAPLY-V

Property	Method	Unit	Typical Value
TPO	—	mils (mm)	22 (.56)
Butyl Alloy	—	mils (mm)	25 (.64)
Thickness per ASTM D 5147 across sheet	ASTM D1970	mils (mm)	47 (1.19)
Water Vapor Transmission	ASTM E96 (Water Method)	perms	0.100
Tensile Strength ¹	ASTM D882	psi	1,360
300% Modulus ¹	ASTM D412	psi	1,390
90° T-Peel	ASTM D1876	lb.	>5.0
Elongation @ Break @ 23°C (Die C) ¹	ASTM D412	%	335
Flexibility Temperature @ -29°C (-20°F) ¹	ASTM D1970	pass/fail	No Cracking @-29°C (-20°F)
Hydrostatic Pressure Resistance	ASTM D5385	ft.	>231 ft. (100 psi)
Peel Strength Over Poured Concrete (tested w/2" strips)	ASTM D903	lb.	5.6

Puncture Resistance Elongation ¹	ASTM E154	in	4.9
Puncture Resistance Load at Puncture	ASTM E154	lb.	106.4
Tear Strength of Vulcanized Rubber and Thermoplastics Die C ¹	ASTM D624	psi	685
Soil Decay Testing- E 96 Permeance	ASTM E154		Pass
Soil Decay Testing- Weight Loss	ASTM E154		Pass
Lateral Water Migration Resistance ²	ASTM D5385 modified		Pass at 100 psi (231 ft) of hydrostatic pressure

¹Data Listed according to Machine Direction criteria where applicable

²Lateral water migration resistance test is performed by casting concrete against butyl side of membrane with a hole and applying a hydrostatic head pressure with water. This test measures the resistance of lateral water migration between membrane and concrete.

1 **PART 3 - EXECUTION**

2 **3.1 GENERAL**

- 3 A. Before any waterproofing work is started the waterproofing applicator shall thoroughly examine all
4 lagging and support for any deficiencies. Should any deficiencies exist, the architect, owner, or
5 general contractor shall be notified in writing and corrections made.

6 **3.2 SUBSTRATE REQUIREMENTS**

- 7 A. The substrate shall be even without noticeable high spots or depressions, smooth, free of protrusions,
8 debris, sharp edges or foreign materials and must be free of accumulated water, ice and snow. For
9 MiraPLY-H system, earth, crushed stone, or soil shall be compacted such that the soil is not
10 displaced from traffic or concrete placement.
11 B. Before any waterproofing work is started the waterproofing applicator shall thoroughly examine
12 all surfaces for any deficiencies. Should any deficiencies exist, the architect, owner, or general
13 contractor shall be notified in writing and corrections made.
14 C. All work shall be performed in accordance with Carlisle-CCW application instructions.

15 **3.3 INSTALLATION: HORIZONTAL**

- 16 A. Refer to the applicable Manufacturer's Technical Data Bulletins for cautions and warnings.
17 B. All substrates shall be smooth and even. Concrete substrate should likewise be smooth and monolithic.
18 Gaps or voids greater than 0.5in (12mm) shall be filled. Gravel sub-base must be 3/4" or smaller aggregate,
19 level and compacted. Install MiraDRAIN over sub-base before installing MiraPLY-H, if substrate
20 requirements cannot be met or required by project requirements. There is to be no standing water.
21 C. CCW MiraDRAIN Composites by Carlisle Coatings and Waterproofing is an acceptable substrate. Install
22 CCW MiraDRAIN with fabric side facing down.
23 D. Always comply with the instructions found in manufacturer's literature, which includes:
24 1. Apply the product with the TPO surface against the prepared surface and the butyl alloy adhesive
25 side facing up.

2. Carefully position successive sheets to overlap the previous sheet by 3 in. (75mm) minimum along the lap line. Be sure the product lays flat with no openings. End laps must be staggered.
3. For side laps simultaneously remove the release liner on the FAT (factory applied tape) pre-primed strip then mate the two sheets together.
4. For end laps, position the MiraPLY Seam Tape in the lap area. Remove release liner on the MiraPLY Seam Tape and mate the two sheets together. For SecurTAPE option, the TPO and Butyl surfaces of lap area shall be clean and primed with HP-250 Primer or Low VOC Primer and allow to flash off then position SecurTAPE 6" in the lap area. Remove release liner on the SecurTAPE and mate two sheets together. Lap area shall be rolled with firm hand pressure to ensure a continuous bond is achieved.

3.4 INSTALLATION: VERTICAL

- A. Refer to the applicable manufacturer's Technical Data Bulletins for cautions and warnings.
- B. All surfaces must be smooth and even. Concrete substrate should likewise be smooth and free of voids. Cracks wider than 0.5in (12mm) shall be filled.
- C. Cover soil retention systems with CCW MiraDRAIN Composites by Carlisle Coatings and Waterproofing. Install CCW MiraDRAIN with fabric side facing toward grade/blind side.
- D. Always comply with the instructions found in manufacturer's literature, which includes:
 1. Start the installation at one corner of the building. Unroll the first sheet of MiraPLY-V and install it square/parallel to building wall centered in the corner with the TPO side facing the MiraDRAIN attached to the soil retention system (lagging, sheet pile, shotcrete, etc.) and the adhesive/release liner facing out. Mechanically fasten the membrane vertically, use fasteners with plastic washer heads that are compatible with the substrate. Ensure MiraPLY-V is not bridging or wrinkled and tight to the corner with no seams in the corner. Install an adequate number of fasteners across the top of the MiraPLY-V to support and keep the membrane tight against the substrate without wrinkles and blousing until concrete is poured. Walls higher than 8'-0" require fasteners in the field of the MiraPLY-V membrane with approximately 1 fastener per 2 ft² (not including fasteners at the perimeter). Fasten perimeter edges of MiraPLY approximately 12" on center and a minimum of 6" from the edge. Caution -- over driven fasteners can cause stress in the membrane and seams.
 2. Unroll the the next sheet of MiraPLY-V and align parallel to and overlap the preceding roll of MiraPLY-V 3" and a minimum 3" end overlap. Stagger end laps. Ensure that the membrane lays flat and no openings are visible. Make sure that the TPO side of the lap is clean, dry and free of contaminants and prime TPO with HP-250 Primer or Low VOC Primer.
 3. Remove the release liner on the lap (edge of the sheet) and mate the two sheets together. Lap area shall be rolled with a hard rubber roller using firm hand pressure.
 4. Leave the plastic liner on MiraPLY-V until ready for concrete pour or placement of rebar. Cover fasteners with a 3" x 3" piece of SecurTAPE, P/S Elastoform Flashing or CCW Detail Tape.

END OF SECTION

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MODIFIED BITUMINOUS SHEET WATERPROOFING (BLINDSIDE WATERPROOFING) OPTION S -
HORIZONTAL AND VERTICAL

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
- 1.2 SUMMARY
- 1.3 DEFINITIONS
- 1.4 REFERENCES
- 1.5 ACTION SUBMITTALS
- 1.6 INFORMATIONAL SUBMITTALS
- 1.7 CLOSEOUT SUBMITTALS
- 1.8 QUALITY ASSURANCE
- 1.9 DELIVERY, STORAGE AND HANDLING
- 1.10 SITE CONDITIONS
- 1.11 WARRANTY

PART 2 - PRODUCTS

- 2.1 MANUFACTURER
- 2.2 WATERPROOFING SYSTEM
- 2.3 BLINDSIDE WATERPROOFING
- 2.4 ACCESSORIES

PART 3 - EXECUTION

- 3.1 EXAMINATION
- 3.2 PREPARATION
- 3.3 DRAINAGE MAT APPLICATION
- 3.4 PRE-APPLIED PROTECTION BOARD APPLICATION
- 3.5 POST APPLIED PROTECTION SHEET APPLICATION
- 3.6 PRIMER APPLICATION
- 3.7 VERTICAL FIELD MEMBRANE APPLICATION (COLPHENE BSW V)
- 3.8 VERTICAL FIELD MEMBRANE APPLICATION (COLPHENE BSW H)
- 3.9 HORIZONTAL FIELD MEMBRANE APPLICATION (COLPHENE BSW H)
- 3.10 LIQUID-APPLIED FLASHING. (PMA MEMBRANE APPLICATION) (ALSAN RS 260 LO FLASH)
- 3.11 LIQUID-APPLIED FLASHING. (PMMA MEMBRANE APPLICATION) (ALSAN 230 FLASH)
- 3.12 LIQUID-APPLIED FLASHING (ELASTOMERIC LIQUID MEMBRANE APPLICATION) (COLPHENE LIQUID MEMBRANE)
- 3.13 LIQUID-APPLIED FLASHING (BITUMEN-URETHANE MEMBRANE APPLICATION) (ALSAN FLASHING)
- 3.14 CLEAN-UP

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. Work shall include, but is not limited to, the following:
 - 1. Preparation of all field and flashing substrates.
 - 2. Drainage mat, mechanically fastened.
 - 3. Protection board, mechanically fastened.
 - 4. SBS-modified bitumen vertical field membrane.
 - 5. SBS-modified bitumen horizontal field membrane.
 - 6. Protection sheet, self-adhered.
 - 7. Liquid-applied, reinforced flashings.
 - 8. All related materials and labor required to complete specified waterproofing necessary to receive specified manufacturer's warranty.

1.3 DEFINITIONS

- A. ASTM D 1079 - Definitions of Term Relating to Roofing and Waterproofing.
- B. The National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual, Fifth Edition Glossary.

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MODIFIED BITUMINOUS
SHEET WATERPROOFING

1.4 REFERENCES

A. American Standard of Testing Methods (ASTM):

1. ASTM C 836 - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
2. ASTM D 903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
3. ASTM D 1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
4. ASTM D 412 - Standard Test Method for Tensile Strength and Ultimate Elongation.
5. ASTM D 5385 - Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes.
6. ASTM D 5385 (modified) -- Standard Test Method for Lateral Water Migration.
7. ASTM D 5601 - Standard Test Method for Tearing Resistance of Roofing and Waterproofing Materials and Membranes.
8. ASTM E 96 - Standard Test Method for Water Vapor Transmission of Materials.
9. ASTM E 154 - Standard Test Method for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
10. ASTM D 1876 - Standard Test Method for Lap Peel Adhesion.
11. ASTM D 570 - Standard Test Method for Water Absorption.
12. ASTM D 1434 - Standard Test Method for Methane Gas Permeability.
13. ASTM D 1894 - Standard Test Method for Coefficient of Friction.

1.5 ACTION SUBMITTALS

- A. Product Data Sheets: Submit manufacturer's product data sheets, installation instructions and/or general requirements for each component.
- B. Safety Data Sheets: Submit manufacturer's Safety Data Sheets (SDS) for each component.
- C. Sample/Specimen Warranty from the manufacturer and contractor.
- D. Shop Drawings: Provide roof plan and applicable roof system detail drawings.

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor Certification: Submit written certification from waterproofing manufacturer certifying that the applicator is authorized by the manufacturer to install the specified materials and system.

1.7 CLOSEOUT SUBMITTALS

- A. Warranty: Provide manufacturer's and contractor's warranties upon substantial completion of the waterproofing.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Manufacturer shall have 20 years of experience manufacturing SBS-modified bitumen waterproofing materials.
2. Provide specified warranty upon satisfactory project completion.

B. Contractor Qualifications:

1. Contractor shall be authorized by the manufacturer to install specified materials prior to the bidding period through satisfactory project completion.
2. Contractor shall provide full time, non-working, on-site superintendent experienced with the specified waterproofing through satisfactory project completion.
3. Applicators shall be skilled in the application methods for all materials.
4. Contractor shall maintain a daily record, on-site, documenting material installation and related project conditions.
5. Contractor shall maintain a copy of all submittal documents, on-site, available at all times, for reference.

- C. The Contractor shall employ a third-party independent observer (TPIO) to confirm compliance with the manufacturer's requirements and the general intent of all blindside waterproofing scope of work. The TPIO must be present at all blindside waterproofing and affiliated work. The TPIO shall attend all construction meetings and shall provide daily reports on a bi-weekly basis.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Refer to each product data sheet or other published literature for specific requirements.
- B. Deliver materials and store them in their unopened, original packaging, bearing the manufacturer's name, related standards, and any other specification or reference accepted as standard.

- 1 C. Protect and store materials in a dry, well-vented, and weatherproof location. Only materials to be used the
2 same day shall be removed from this location. During cold weather, store materials in a heated location,
3 removed only as needed for immediate use.
- 4 D. When materials are to be stored outdoors, store away from standing water, stacked on raised pallets or
5 dunnage, at least 4 in or more above ground level. Carefully cover storage with "breathable" tarpaulins to
6 protect materials from precipitation and to prevent exposure to condensation.
- 7 E. Carefully store waterproofing membrane materials delivered in rolls on-end with selvage edges up. Store
8 and protect roll storage to prevent damage.
- 9 F. Properly dispose of all product wrappers, pallets, cardboard tubes, scrap, waste, and debris. All damaged
10 materials shall be removed from job site and replaced with new, suitable materials.

11 **1.10 SITE CONDITIONS**

- 12 A. Safety:
- 13 1. The contractor shall be responsible for complying with all project-related safety and environmental
14 requirements.
- 15 2. Heat-welding shall include heating the specified membrane ply using propane roof torches or electric
16 hot-air welding equipment. The contractor shall determine when and where conditions are
17 appropriate to utilize heat-welding equipment. When conditions are determined by the contractor to
18 be unsafe to proceed, equivalent SBS-modified bitumen materials and methods shall be utilized to
19 accommodate requirements and conditions.
- 20 3. Refer to NRCA CERTA recommendations, local codes and building owner's requirements for hot
21 work operations.
- 22 4. The contractor shall review project conditions and determine when and where conditions are
23 appropriate to utilize the specified liquid-applied, or semi-solid waterproofing materials. When
24 conditions are determined by the contractor to be unsafe or undesirable to proceed, measures shall
25 be taken to prevent or eliminate the unsafe or undesirable exposures and conditions, or equivalent
26 approved materials and methods shall be utilized to accommodate requirements and conditions.
- 27 5. The contractor shall refer to product Safety Data Sheets (SDS) for health, safety, and environment
28 related hazards, and take all necessary measures and precautions to comply with exposure
29 requirements.
- 30 B. Environmental Conditions:
- 31 1. Monitor substrate temperature and material temperature, as well as all environmental conditions such
32 as ambient temperature, moisture, sun, cloud cover, wind, humidity, and shade. Ensure conditions
33 are satisfactory to begin work and ensure conditions remain satisfactory during the installation of
34 specified materials. Materials and methods shall be adjusted as necessary to accommodate varying
35 project conditions. Materials shall not be installed when conditions are unacceptable to achieve the
36 specified results.
- 37 2. Precipitation and dew point: Monitor weather to ensure the project environment is dry before, and
38 will remain dry, during the application of waterproofing materials. Ensure all waterproofing materials
39 and substrates remain above the dew point temperature as required to prevent condensation and
40 maintain dry conditions.
- 41 3. Self-adhered membrane application: During cold weather, store the specified self-adhered
42 membrane and primer materials in heated storage areas to ensure materials remain no less than
43 70°F (21°C) during application. Ensure conditions allow primer to remain tacky, but not wet so that
44 primer will transfer to finger when touched. Self-adhered primer should not fully dry and lose tack
45 before applying the self-adhered membrane. Ensure conditions remain satisfactory to achieve
46 membrane adhesion as specified.
- 47 4. Heat-Welding Application: Take all necessary precautions and measures to monitor conditions to
48 ensure all environmental conditions are safe to proceed with the use of torches and hot-air welding
49 equipment. Combustibles, flammable liquids and solvent vapors that represent a hazard shall be
50 eliminated and primers shall be fully dry before proceeding with heat-welding operations. Refer to
51 NRCA CERTA recommendations.

52 **1.11 WARRANTY**

- 53 A. Manufacturer's Warranty: The manufacturer shall provide the owner with the manufacturer's warranty
54 providing labor and materials for a period of 10 years from the date the warranty is issued.
- 55 B. The contractor shall guarantee the workmanship and shall provide the owner with the contractor's warranty
56 covering workmanship for a period of 2 years from completion date.

1 PART 2 - PRODUCTS

2 2.1 MANUFACTURER

- 3 A. Single Source Manufacturer: All products shall be provided by a single supplier with 20 years or more
4 waterproofing manufacturing history in the US.
5 1. Comply with the Manufacturer's requirements as necessary to provide the specified warranty.
6 B. Product Quality Assurance Program: Manufacturer shall be an ISO 9001 registered company.
7 C. Acceptable Manufacturer:
8 1. Soprema, located at: 310 Quadral Dr., Wadsworth, OH 44281; Tel: 800-356-3521; Tel: 330-334-
9 0066; Website: www.soprema.us.
10 2. Acceptable Alternate Manufacturers: Tremco and Carlisle.

11 2.2 WATERPROOFING SYSTEM

- 12 A. Waterproofing Basis of Design:
13 1. Soprema

14 2.3 SUBSTRATE PREPARED SURFACING

15 A. Substrate Membrane:

- 16 1. SBS-Modified Bitumen:
17 a. Soprema Colphene BSW V: SBS-modified bitumen, self-adhesive membrane with release
18 film on the bottom surface and a sanded top surface used for vertical blindside waterproofing
19 applications. Composite reinforcement. DUO SELVEDGE side laps.
20 1) Thickness: 120 mils (3.0 mm)
21 2) Width: 39.4 in (1 m)
22 3) Length: 32.8 ft (10 m)
23 4) Adhesion of Poured Concrete (ASTM D 903 modified): 24.2 lbf/in (4235 N/m)
24 5) Puncture Resistance (ASTM E154): 350 lb (1557 N)
25 6) Resistance to Hydrostatic Head (ASTM D 5385 modified): >360 ft (110 m)
26 7) Resistance to Lateral Migration (ASTM D 5385 modified): >360 ft (110 m)
27 8) Tensile Strength, MD/XD (ASTM D 412): 3437/2638 psi (23.7/18.1 MPa)
28 9) Ultimate Elongation, MD/XD (ASTM D 412): 67/74 %
29 10) Low Temperature Flexibility (ASTM D 1970): Unaffected at -4°F (-20°C)
30 11) Tear Resistance (ASTM D 5601): 28.1 lbf (125 N)
31 12) Low Temperature Crack Bridging (ASTM C 836 (C1305)): Unaffected at -9°F (-23°C)
32 13) Lap Peel Adhesion (ASTM D 1876): 7.7 lbf/in (1360 N/m)
33 14) Water Vapor Transmission (ASTM E 96 Procedure B): <0.037 perms (2.1 ng/Pa·s·m²)
34 15) Water Absorption (maximum) (ASTM D 570): 0.5 %
35 16) Methane Gas Permeability (ASTM D 1434): 1.6*10⁻⁶ ft²/hr at 14.7 psia (4.12*10⁻⁷
36 cm²/sec at 1 atm)
37 17) Coefficient of Friction (ASTM D 1894): sanded side on sanded side, 1.03 static 0.76
38 kinetic
39 18) Coefficient of Friction (ASTM D 1894): sanded side on concrete, 0.84 static 0.67
40 kinetic
41 b. Soprema Colphene BSW H: SBS-modified bitumen membrane with plastic burn-off film on
42 the bottom surface and a sanded top surface used for vertical blindside waterproofing
43 applications. Polyester reinforcement.
44 1) Thickness: 140 mils (3.5 mm)
45 2) Width: 39.4 in (1 m)
46 3) Length: 32.8 ft (10 m)
47 4) Adhesion of Poured Concrete (ASTM D 903 modified): 19.6 lbf/in (3430 N/m)
48 5) Puncture Resistance (ASTM E154): 311 lb (1383N)
49 6) Resistance to Hydrostatic Head (ASTM D 5385 modified): >360 ft (110 m)
50 7) Resistance to Lateral Migration (ASTM D 5385 modified): >360 ft (110 m)
51 8) Tensile Strength, MD/XD (ASTM D 412): 3437/2638 psi (23.7/18.1 MPa)
52 9) Ultimate Elongation, MD/XD (ASTM D 412): 67/74 %
53 10) Low Temperature Flexibility (ASTM D 1970): Unaffected at -4°F (-20°C)
54 11) Tear Resistance (ASTM D 5601): 28.1 lbf (125 N)
55 12) Low Temperature Crack Bridging (ASTM C 836 (C1305)): Unaffected at -9°F (-23°C)
56 13) Lap Peel Adhesion (ASTM D 1786): 7.7 lbf/in (1360 N/m)
57 14) Water Vapor Transmission (ASTM E 96 Procedure B): <0.037 perms (2.1 ng/Pa·s·m²)
58 15) Water Absorption (maximum) (ASTM D 570): 0.5 %

ISSUED FOR ADDENDUM #2

JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE

CONTRACT # 7952 MUNIS # 11471

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MODIFIED BITUMINOUS
SHEET WATERPROOFING

- 16) Methane Gas Permeability (ASTM D 1434): 1.6×10^{-6} ft²/hr at 14.7 psia (4.12×10^{-7} cm²/sec at 1 atm)
 - 17) Coefficient of Friction (ASTM D 1894): sanded side on sanded side, 1.04 static 0.71 kinetic
 - 18) Coefficient of Friction (ASTM D 1894): sanded side on concrete, 0.75 static 0.63 kinetic
- B. Horizontal Field Membrane:
1. SBS-Modified Bitumen:
 - a. Soprema Colphene BSW H: SBS-modified bitumen membrane with plastic burn-off film on the bottom surface and a sanded top surface used for horizontal blindside waterproofing applications. Polyester reinforcement.
 - 1) Thickness: 140 mils (3.5 mm)
 - 2) Width: 39.4 in (1 m)
 - 3) Length: 32.8 ft (10 m)
 - 4) Adhesion of Poured Concrete (ASTM D 903 modified): 19.6 lbf/in (3430 N/m)
 - 5) Puncture Resistance (ASTM E154): 311 lb (1383N)
 - 6) Resistance to Hydrostatic Head (ASTM D 5385 modified): >360 ft (110 m)
 - 7) Resistance to Lateral Migration (ASTM D 5385 modified): >360 ft (110 m)
 - 8) Tensile Strength, MD/XD (ASTM D 412): 3437/2638 psi (23.7/18.1 MPa)
 - 9) Ultimate Elongation, MD/XD (ASTM D 412): 67/74 %
 - 10) Low Temperature Flexibility (ASTM D 1970): Unaffected at -4°F (-20°C)
 - 11) Tear Resistance (ASTM D 5601): 28.1 lbf (125 N)
 - 12) Low Temperature Crack Bridging (ASTM C 836 (C1305)): Unaffected at -9°F (-23°C)
 - 13) Lap Peel Adhesion (ASTM D 1786): 7.7 lbf/in (1360 N/m)
 - 14) Water Vapor Transmission (ASTM E 96 Procedure B): <0.037 perms (2.1 ng/Pa·s·m²)
 - 15) Water Absorption (maximum) (ASTM D 570): 0.5 %
 - 16) Methane Gas Permeability (ASTM D 1434): 1.6×10^{-6} ft²/hr at 14.7 psia (4.12×10^{-7} cm²/sec at 1 atm)
 - 17) Coefficient of Friction (ASTM D 1894): sanded side on sanded side, 1.04 static 0.71 kinetic
 - 18) Coefficient of Friction (ASTM D 1894): sanded side on concrete, 0.75 static 0.63 kinetic
- C. Flashing Membrane
1. Polymethacrylate Liquid-applied Flashing (PMA):
 - a. Soprema Alsan RS 260 LO Flash System: Liquid-applied, catalyzed flashing membrane with an embedded polyester reinforcement fabric used for monolithic waterproofing flashing membranes.
 - 1) Soprema Alsan RS 260 LO Flash: Low odor, rapid curing, polymethacrylate (PMA) liquid resin.
 - a) VOC Content: 0.5 g/L
 - b) Color: White
 - 2) Soprema Alsan RS Catalyst Powder: Reactive agent used to induce curing of PMA resin products.
 - 3) Soprema Alsan RS Fleece: Woven polyester reinforcement used in PMA liquid membrane applications.
 - a) Thickness: 30-40 mils (0.8-1 mm)
 - b) Weights: 110 g/m²
 - c) Width: Size as required.
 - d) Length: 164 ft (50 m)
 2. Polymethyl Methacrylate Liquid-applied Flashing (PMMA):
 - a. Soprema Alsan RS 230 Flash System: Liquid-applied, catalyzed flashing membrane with an embedded polyester reinforcement fabric used for monolithic waterproofing flashing membranes.
 - 1) Soprema Alsan RS 230 Flash: Rapid curing, polymethyl methacrylate (PMMA) liquid resin with an embedded polyester reinforcement fabric used for monolithic blindside waterproofing flashing applications.
 - a) VOC Content: 4.2 g/L
 - b) Color: White
 - 2) Soprema Alsan RS Catalyst Powder: Reactive agent used to induce curing of PMMA resin products.
 - 3) Soprema Alsan RS Fleece: Woven polyester reinforcement used in PMMA liquid membrane applications.

ISSUED FOR ADDENDUM #2

JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE

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- 1 a) Thickness: 30-40 mills (0.8-1 mm)
- 2 b) Weights: 110 g/m²
- 3 c) Width: Size as required.
- 4 d) Length: 164 ft (50 m)
- 5 3. Elastomeric Liquid-applied Flashing:
- 6 a. Soprema Colphene Liquid Membrane Flashing System: Two-component, bituminous, solvent
- 7 free liquid membrane reinforced with self-adhesive modified bitumen membrane.
- 8 1) Soprema Colphene Liquid Membrane: Two component, elastomeric, solvent free
- 9 liquid used to flash blindside waterproofing penetrations.
- 10 2) Soprema Colphene 3000: SBS-modified bitumen, self-adhesive membrane with
- 11 release film on the bottom surface and a polyethylene woven composite facer used to
- 12 reinforce Soprema Colphene Liquid Membrane.
- 13 a) Thickness: 60 mills (1.5 mm)
- 14 b) Width: 36 in (0.9 m)
- 15 c) Length: 61 ft (18.6 m)
- 16 4. Polyurethane Liquid-applied Flashing:
- 17 a. Soprema Alsan Flashing System: Liquid-applied, single-component, reinforced flashing
- 18 membrane.
- 19 1) Soprema Alsan Flashing: Single-component, polyurethane-bitumen resin with
- 20 polyester reinforcing fleece fabric fully embedded into the resin used to flash
- 21 penetrations in blindside waterproofing applications.
- 22 a) Solids Content: 80%
- 23 b) Meets or exceeds ASTM C836.
- 24 2) Alsan Polyfleece: Non-woven polyester reinforcement.
- 25 5. Polymethyl Methacrylate (PMMA) Detailing Flashing:
- 26 a. Soprema Alsan RS Detailer Flashing System: Rapid curing, catalyzed polymethyl
- 27 methacrylate (PMMA) liquid resin with microfibers used as the waterproofing paste where it
- 28 is difficult to install a conventional reinforced waterproofing membrane.
- 29 1) Soprema Alsan RS Detailer: Polymethyl methacrylate (PMMA) liquid resin with
- 30 microfibers used as the waterproofing paste where it is difficult to install a conventional
- 31 reinforced waterproofing membrane.
- 32 2) Soprema Alsan RS Catalyst Powder: Reactive agent used to induce curing of PMMA
- 33 resin products.
- 34 D. Drainage Mat:
- 35 1. Soprema Sopradrain 10-G: High density drainage mat with a non-woven, factory laminated geotextile
- 36 fabric on the top side used to drain vertical and horizontal blindside waterproofing applications.
- 37 a. Width: 72 in (1.83 m)
- 38 b. Length: 50 ft (15.25 m)
- 39 c. Compressive Strength (kPa): 550 (11,000 psf)
- 40 2. Soprema Sopradrain ECO-2: Entangled polypropylene filament drainage mat with a geocomposite
- 41 fabric on both sides used to drain vertical and horizontal blindside waterproofing applications.
- 42 a. Width: 39 in (1 m)
- 43 b. Length: 100 ft (30 m)
- 44 c. Compressive Strength: 1436 kPa (>30,000 psf).
- 45 E. Pre-applied Protection Board
- 46 1. Soprema Sopraboard: Mineral fortified, asphaltic roof substrate board with glass fiber facers. For
- 47 use as a protection board on vertical and horizontal substrates in blindside waterproofing
- 48 applications. Asphaltic Protection Board shall be manufactured by the membrane supplier.
- 49 a. Thickness: 1/4 in
- 50 b. Dimensions: 4 x 4 ft
- 51 F. Post Applied Protection Sheet
- 52 1. Soprema Colphene BSW Protect'r: SBS-modified bitumen, self-adhesive membrane with release film
- 53 on the bottom surface and a sanded top surface used as a secondary protection on horizontal
- 54 blindside waterproofing applications. Composite reinforcement.
- 55 a. Thickness: 80 mills (2.0 mm)
- 56 b. Width: 39.4 in (1 m)
- 57 c. Length: 49.2 ft (15 m)

58 2.4 ACCESSORIES

59 A. Primers:

- 1 1. Soprema Sopraseal Stick: Self-Adhered membrane primer. SBS polymer, resin and, solvent-based
2 primer for the preparation of membrane substrates for self-adhered SBS membrane and self-adhered
3 SBS flashing applications.
4 2. Soprema Elastocol Stick Zero: Zero VOC, self-adhesive membrane primer. Low VOC solvent-based
5 primer for the preparation of membrane substrates for self-adhered SBS membrane and self-adhered
6 SBS flashing applications.
7 B. Fasteners and Plates:
8 1. Soprema #12 DP Fastener and 3 in stress plate: Fastener and plate used to secure drainage mat to
9 wood lagging.
10 2. Soprema #12 DP Fastener and 2 in stress plate: Fastener and plate used to secure vertical field
11 membrane to wood lagging.
12 C. Waterstop: Bentonite/butyl-rubber waterstop, RX-101 rectangle, 1" x 3/4", such as by Volclay,
13 www.CETCO.com.

14 PART 3 - EXECUTION

15 3.1 **EXAMINATION**

- 16 A. Examination includes visual observations, qualitative analysis, and quantitative testing measures as
17 necessary to ensure conditions remain satisfactory throughout the project.
18 B. The contractor shall examine all waterproofing substrates.
19 C. The applicator shall not begin installation until conditions have been properly examined and determined to
20 be clean, dry and, otherwise satisfactory to receive specified waterproofing materials.
21 D. During the application of specified materials, the applicator shall continue to examine all project conditions
22 to ensure conditions remain satisfactory to complete the specified waterproofing system.
23 E. No waterproofing membranes will be installed during rain or snowfall. Use of salt or calcium is prohibited to
24 remove ice or snow.
25 F. Verify the compatibility of all membrane components with curing compounds, coatings or other materials
26 which are already or will be installed on the surfaces to be treated.

27 3.2 **PREPARATION**

- 28 A. Before commencing work each day, the contractor shall prepare all waterproofing substrates to ensure
29 conditions are satisfactory to proceed with the installation of specified waterproofing materials. Preparation
30 of substrates includes, but is not limited to, substrate repairs, securement of substrates, eliminating all
31 incompatible materials, and cleaning.
32 B. Where conditions are found to be unsatisfactory, work shall not begin until conditions are made satisfactory
33 to begin work. Commencing of work shall indicate contractor's acceptance of conditions.

34 3.3 **DRAINAGE MAT APPLICATION**

- 35 A. Drainage board must be supported and follow the shapes of the substrate.
36 B. Drainage board can bridge cracks and/or holes in the substrate from 1 to 2 in wide and deep. Cracks and/or
37 holes in the substrate exceeding 2 in shall be prepared using mortar, shotcrete, plywood, Sopraboard
38 (mechanically attached to substrate) or other approved method prior to the placement of the drainage board.
39 C. Install drainage mat in accordance with membrane manufacturer's published instructions.
40 D. Place and secure drainage mat with the filter fabric facing the positive side of the waterproofing. Overlap the
41 edges of the geotextile fabric to maintain continuity.
42 E. For vertical applications, fasten drainage mat to substrate using appropriate fasteners and plates.
43 F. Ensure drainage panels are not damaged during subsequent construction.

44 3.4 **PRE-APPLIED PROTECTION BOARD APPLICATION**

- 45 A. Install protection board in accordance with manufacturer's published instructions.
46 B. Place and secure all boards fitted against adjoining boards to form tight joints.
47 C. For vertical applications, fasten and secure protection board to substrate using appropriate fasteners for the
48 substrate.
49 D. Ensure protection board is not damaged during subsequent construction.

50 3.5 **POST APPLIED PROTECTION SHEET APPLICATION**

- 51 A. Follow material product data sheets and published general requirements for installation instructions.
52 B. Ensure environmental conditions are satisfactory, and will remain satisfactory, during the application of the
53 self-adhesive membrane.

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- 1 C. Ensure horizontal field membrane is prepared and available to receive the self-adhesive membrane.
- 2 D. Unroll the protection sheet and loose lay in place.
- 3 E. Ensure minimum 1 in side and end-laps.
- 4 F. Adhere the protection sheet in a continuous longitudinal strip over the horizontal waterproofing membrane
- 5 by removing the silicone release film.
- 6 G. As the release film is peeled away, use a stiff push broom or roller to firmly set the sheet in place. Ensure
- 7 full contact is made between the ply and the substrate for full adhesion.
- 8 H. Each day, physically inspect all side and end-laps, and ensure the membrane is sealed watertight.
- 9 I. Inspect the installation each day to ensure the plies are fully adhered. Repair all unadhered voids, wrinkles,
- 10 open laps and all other deficiencies.
- 11 J. Repair deficiencies using specified heat-welded or self-adhesive membrane. For self-adhesive repairs,
- 12 prime surfaces using specified self-adhesive primer. Repairs shall extend 6 in beyond the damaged
- 13 membrane.

14 3.6 FIELD PLY APPLICATION

- 15 A. Examine all substrates and conduct adhesion peel tests as necessary to ensure satisfactory adhesion is
- 16 achieved.
- 17 B. Apply the specified self-adhesive primer to dry, compatible substrates where determined primer is necessary
- 18 to enhance adhesion.
- 19 C. For the self-adhesive waterproofing applied during cold temperatures (below 50°F) the specified self-
- 20 adhesive primer shall be applied.
- 21 D. Apply primer using brush, roller, or sprayer at the rate published on the product data sheet.
- 22 E. Ensure self-adhered membrane primer is tacky to-the-touch, but not wet. Primer should not transfer to the
- 23 finger tips when touched.
- 24 F. As project conditions vary throughout the day, applicator shall monitor changing conditions, monitor the
- 25 drying time of primers, and monitor the adhesion of the membrane plies. Adjust primer and membrane
- 26 application methods as necessary to achieve the desired results.

27 3.7 VERTICAL FIELD MEMBRANE APPLICATION (COLPHENE BSW V)

- 28 A. Follow material product data sheets and published general requirements for installation instructions.
- 29 B. Temporarily fasten the top leading edge of the waterproofing ply in place using specified fasteners and
- 30 plates. Upon completion, remove and seal fastener holes using specified heat welded waterproofing
- 31 membrane or specified liquid-applied flashing.
- 32 C. Vertical blind side waterproofing membrane shall be applied in lengths not exceeding 16 ft or as necessary
- 33 to accommodate project conditions.
- 34 D. Once in place, remove the release film on the underside of the sheet.
- 35 E. As the release film is peeled away, use an approved membrane roller to roll-in vertical membrane to firmly
- 36 set the sheet in place. Ensure full contact is made between the ply and the substrate for full adhesion.
- 37 F. Ensure a minimum 4 in side-lap is achieved.
- 38 G. The 4 in duo-selvage side-lap consists of 2 in of self-adhesive on the inside edge of the lap and 2 in of heat
- 39 welded membrane along the outside edge of the side-lap.
- 40 H. Using a roller, seal the self-adhesive portion of the side-lap, and use an approved roofing torch or hot-air
- 41 welder to seal the 2 in heat welded portion of the side lap.
- 42 I. All waterproofing end-laps shall be overlapped 6 in and fully adhered by heat welding.
- 43 J. All end lap joints shall be aligned and overlapped a minimum of 6 in beyond all fastener penetrations and
- 44 holes where fasteners were removed.
- 45 K. Ensure all membrane T-joints are heat welded and fully sealed.
- 46 L. Waterproofing over concrete cold joints shall be reinforced by installing an additional 12 in reinforcing ply of
- 47 membrane over the cold joint, fully heat-welded or self-adhered over primed surface. The waterproofing
- 48 reinforcing ply shall be centered in the angle of the cold joint or over the cold joint.
- 49 M. All waterproofing membrane tie-ins shall be heat-welded to the adjacent ply.
- 50 N. If a negative/back-water lap is created on the positive side of the waterproofing, heat weld or self-adhere a
- 51 reinforcing ply to strip-in the end-lap joint. The reinforcing ply shall extend a minimum of 4 in beyond the
- 52 joint in both directions.
- 53 O. Each day, the contractor shall physically inspect all side and end-laps, and ensure the membrane is fully
- 54 sealed watertight.
- 55 P. Inspect the installation each day to ensure the plies are secure and adhered.
- 56 Q. Repair deficiencies using specified heat-welded or self-adhesive membrane. For self-adhesive repairs,
- 57 prime surfaces using specified self-adhesive primer. Repairs shall extend 6 in beyond the damaged
- 58 membrane.

- 1 3.8 VERTICAL FIELD MEMBRANE APPLICATION (COLPHENE BSW H)
2 A. Follow material product data sheets and published general requirements for installation instructions.
3 B. Temporarily fasten the top leading edge of the waterproofing ply in place using specified fasteners and
4 plates. Upon completion, remove seal and fastener holes using specified heat welded waterproofing
5 membrane or specified liquid-applied flashing.
6 C. Vertical blind side waterproofing membrane shall be applied in lengths not exceeding 16 ft or as necessary
7 to accommodate project conditions.
8 D. Ensure a minimum 4 in side-lap is achieved.
9 E. The 4 in duo-selvage side-lap consists of 2 in of self-adhesive on the inside edge of the lap and 2 in of heat
10 welded membrane along the outside edge of the side-lap.
11 F. Remove the side-lap release film, and use a roller to seal the self-adhesive portion of the side-lap. Use an
12 approved roofing torch or hot-air welder to seal the 2 in heat welded portion of the side lap.
13 G. All end lap joints shall be aligned and overlapped a minimum of 6 in beyond all fastener penetrations and
14 holes where fasteners were removed.
15 H. Waterproofing over concrete cold joints shall be reinforced by installing an additional 12 in reinforcing ply of
16 membrane over the cold joint, fully heat-welded or self-adhered over primed surface. The waterproofing
17 reinforcing ply shall be centered in the angle of the cold joint or over the cold joint.
18 I. All waterproofing membrane tie-ins shall be heat-welded to the adjacent ply.
19 J. If a negative/back-water lap is created on the positive side of the waterproofing, heat weld or self-adhere a
20 reinforcing ply to strip-in the end-lap joint. The reinforcing ply shall extend a minimum of 4 in beyond the
21 joint in both directions.
22 K. Each day, the contractor shall physically inspect all side and end-laps, and ensure the membrane is fully
23 sealed watertight.
24 L. Inspect the installation each day to ensure the plies are secure and adhered.
25 M. Repair deficiencies using specified heat-welded or self-adhesive membrane. For self-adhesive repairs,
26 prime surfaces using specified self-adhesive primer. Repairs shall extend 6 in beyond the damaged
27 membrane.
- 28 3.9 HORIZONTAL FIELD MEMBRANE APPLICATION (COLPHENE BSW H)
29 A. Follow material product data sheets and published general requirements for installation instructions.
30 B. Unroll horizontal blind side waterproofing membrane loose-laid onto the prepared substrate, or onto
31 specified drainage mat/protection board where applicable per design requirements.
32 C. The 4 in duo-selvage side-lap consists of 2 in of self-adhesive on the inside edge of the lap and 2 in of heat
33 welded membrane along the outside edge of the side-lap.
34 D. Remove the side-lap release film, and use a roller to seal the self-adhesive portion of the side-lap. Use an
35 approved roofing torch or hot-air welder to seal the 2 in heat welded portion of the side lap.
36 E. All end lap joints shall be overlapped a minimum of 6 in.
37 F. End-laps shall be staggered 12 in or more. Where T-joints are formed at the end-laps, cut away a 4 in corner
38 at a 45° angle from the overlying end-lap.
39 G. Waterproofing over concrete cold joints shall be reinforced by installing an additional 12 in reinforcing ply of
40 membrane over the cold joint, fully heat-welded or self-adhered over primed surface. The waterproofing
41 reinforcing ply shall be centered in the angle of the cold joint or over the cold joint.
42 H. All waterproofing membrane tie-ins shall be heat-welded to the adjacent ply.
43 I. Each day, the contractor shall physically inspect all side and end-laps, and ensure the membrane is fully
44 sealed watertight.
45 J. Inspect the installation each day to ensure the plies are secure and adhered.
46 K. Repair deficiencies using specified heat-welded or self-adhesive membrane. For self-adhesive repairs,
47 prime surfaces using specified self-adhesive primer. Repairs shall extend 6 in beyond the damaged
48 membrane.
- 49 3.10 LIQUID-APPLIED FLASHING, (PMA MEMBRANE APPLICATION) (ALSAN RS 260 LO FLASH)
50 A. Refer to manufacturer's details drawings, product data sheets and published general requirements for
51 application rates and specific installation instructions.
52 B. Pre-cut polyester reinforcing fleece to conform to roof terminations, transitions and penetrations being
53 flashed. Ensure a minimum 2 in overlap of fleece at side and end-laps. Ensure the completed liquid-applied
54 flashing membrane is fully reinforced.
55 C. Apply the base coat of catalyzed liquid resin onto the substrate using a brush or roller, working the material
56 into the surface for complete coverage and full adhesion.
57 D. Immediately apply the reinforcing fleece into the wet base coat of resin. Using a brush or roller, work the
58 reinforcing fabric into the wet resin while applying the second coat of catalyzed liquid resin to completely
59 encapsulate the fleece.

- 1 E. Refer to reinforced, polymethacrylate (PMA) specification section and application instructions, details
2 drawings, product data sheets and published general requirements for installation instructions.
- 3 3.11 LIQUID-APPLIED FLASHING, (PMMA MEMBRANE APPLICATION) (ALSAN 230 FLASH)
4 A. Refer to manufacturer's details drawings, product data sheets and published general requirements for
5 application rates and specific installation instructions.
6 B. Pre-cut polyester reinforcing fleece to conform to roof terminations, transitions and penetrations being
7 flashed. Ensure a minimum 2 in overlap of fleece at side and end-laps. Ensure the completed liquid-applied
8 flashing membrane is fully reinforced.
9 C. Apply the base coat of catalyzed liquid resin onto the substrate using a brush or roller, working the material
10 into the surface for complete coverage and full adhesion.
11 D. Immediately apply the reinforcing fleece into the wet base coat of resin. Using a brush or roller, work the
12 reinforcing fabric into the wet resin while applying the second coat of catalyzed liquid resin to completely
13 encapsulate the fleece.
14 E. Refer to reinforced, polymethyl-methacrylate (PMMA) specification section and application instructions,
15 details drawings, product data sheets and published general requirements for installation instructions.
- 16 3.12 LIQUID-APPLIED FLASHING, (ELASTOMERIC LIQUID MEMBRANE APPLICATION) (COLPHENE
17 LIQUID MEMBRANE)
18 A. Refer to manufacturer's detail drawings, product data sheets and published general requirements for
19 application rates and specific installation instructions.
20 B. Dispense the liquid-applied membrane from 2-component cartridge onto the substrate, then evenly apply
21 over the work area using a trowel.
22 C. Remove release film from Colphene 3000 and apply over the wet Colphene liquid Membrane immediately
23 before the liquid skins over.
24 D. For pipe penetrations and similar round details, secure a stainless steel pipe clamp around top leading edge
25 of the reinforced liquid flashing before Colphene Liquid Membrane has cured.
- 26 3.13 LIQUID-APPLIED FLASHING, (BITUMEN-URETHANE MEMBRANE APPLICATION) (ALSAN
27 FLASHING)
28 A. Refer to manufacturer's details drawings, product data sheets and published general requirements for
29 application rates and specific installation instructions.
30 B. Pre-cut Colphene BSW H to conform to penetration.
31 C. Field-wrap and heat weld Colphene BSW H to completely flash and seal the penetration watertight.
32 D. Apply reinforced Alsan Flashing over Colphene BSW H to fully encapsulate and seal the penetration.
33 1. Pre-cut polyester reinforcing fleece to conform to roof terminations, transitions and penetrations
34 being flashed. Ensure a minimum 2 in overlap of fleece at side and end-laps. Ensure the completed
35 liquid-applied flashing membrane is fully reinforced.
36 2. Apply the base coat of liquid resin onto the substrate using a brush or roller, working the material into
37 the surface for complete coverage and full adhesion at 2.0 gallons per square.
38 3. Immediately apply the reinforcing fleece into the wet base coat of resin. Using a brush or roller, work
39 the fleece into the wet resin while applying the second coat of liquid resin to completely encapsulate
40 the fleece at 2.0 gallons per square, and extend the liquid resin 1 inch beyond the fleece.
41 4. Allow the liquid membrane to sufficiently cure for 24 to 48 hours then apply the finish coat of liquid
42 resin at 2.0 gallons per square.
43 E. Pre-cut Colphene BSW V and remove the self-adhesive release film.
44 F. Ensure Alsan flashing has cured then wrap the pipe with the Colphene BSW V.
45 G. Secure a stainless steel pipe clamp around the Colphene BSW V.
- 46 3.14 CLEAN-UP
47 A. Clean-up and properly dispose of waste and debris resulting from these operations each day as required to
48 prevent damages and disruptions to operations.
49
50

END OF SECTION

SECTION 07 19 00

WATER REPELLENTS

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
- 1.2 SUMMARY
- 1.3 PREINSTALLATION MEETINGS
- 1.4 ACTION SUBMITTALS
- 1.5 INFORMATIONAL SUBMITTALS
- 1.6 PRECONSTRUCTION TESTING
- 1.7 FIELD CONDITIONS
- 1.8 WARRANTY

PART 2 - PRODUCTS

- 2.1 WATER REPELLENTS

PART 3 - EXECUTION

- 3.1 EXAMINATION
- 3.2 PREPARATION
- 3.3 APPLICATION

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 film-forming water-repellent treatments for the following vertical and horizontal surfaces:
 - 1. Concrete unit masonry.
 - 2. Natural stone.
- B. Related Requirements:
 - 1. ~~Section 03 01 30 "Maintenance of Cast-in-Place Concrete" for high-build penetrating polymer sealers for exterior traffic surfaces.~~
 - 2. Section 04 22 00 "Concrete Unit Masonry" for integral water-repellent admixture for unit masonry assemblies.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's printed statement of VOC content.
 - 2. Include manufacturer's recommended number of coats for each type of substrate and spreading rate for each separate coat.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of water repellent.
- B. Preconstruction Test Reports: For water-repellent-treated substrates.
- C. Sample Warranty: For special warranty.

1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Testing: Engage a qualified testing agency to perform preconstruction testing of water repellents on field mockups.
 - 1. Test a minimum 4 ft. by 4 ft. area on each type of masonry. Use the manufacturer's application instructions. Let test area protective treatment cure before inspection. Keep test panels available for comparison throughout the protective treatment project.
 - 2. In addition to verifying performance requirements, use mockups to verify manufacturer's written instructions for application procedure and optimum rates of product application to substrates.
 - 3. Propose changes to materials and methods to suit Project.
 - 4. Notify Architect seven days in advance of the dates and times when mockups will be tested.

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WATER REPELLENTS

1.7 FIELD CONDITIONS

- A. Limitations: Proceed with application only when the following existing and forecasted weather or substrate conditions permit water repellents to be applied according to manufacturers' written instructions and warranty requirements:
1. Concrete surfaces and mortar have cured for not less than 28 days.
 2. Building has been closed in for not less than 30 days before finishing wall assemblies.
 3. Ambient temperature is above 40 deg F and below 100 deg F and will remain so for 24 hours.
 4. Substrate is not frozen and substrate-surface temperature is above 40 deg F and below 100 deg F.
 5. Rain or snow is not predicted within 24 hours.
 6. Not less than 2 hours have passed since surfaces were last wet.
 7. Windy conditions do not exist that might cause water repellent to be blown onto vegetation or surfaces not intended to be treated.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer and applicator agree(s) to repair or replace materials that fail to maintain water repellency and prevent graffiti within specified warranty period.
1. Warranty Period: Two years from the end of substantial completion.

PART 2 - PRODUCTS

2.1 WATER REPELLENTS

- A. High performance, clear, solvent-based silicone elastomer formulated to weatherproof concrete block and other porous masonry materials and protect treated surfaces from repeated graffiti attacks with little to no change to the natural appearance.
1. Applied with low-pressure spray, brush or roller, product penetrates and fills pores to prevent water penetration through exterior walls exposed to normal weathering. Graffiti removal is achieved using Defacer Eraser® Graffiti Wipe.
 2. Basis of Design: Subject to compliance with requirements, provide the following product that may be incorporated into the Work, but are not limited to, the following:
 - a. Sure Klean® Weather Seal Blok-Guard® & Graffiti Control Ultra 15.
- B. Technical Properties:
1. Form: Clear liquid, petroleum odor.
 2. Specific Gravity: 1.28.
 3. pH: not applicable.
 4. Weight/Gallon: 10.62 pounds.
 5. Active Content: 15 percent.
 6. Total Solids: 15 percent ASTM D2369.
 7. Voc Content: less than 100 grams per Liter.
 8. Flash Point: 100,degrees F (38 degrees C) ASTM D3278.
 9. Freeze Point: less than -22 degrees F (less than -30 degrees C).
 10. Shelf Life: 1 year in tightly sealed, unopened container.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements and conditions affecting performance of the Work.
1. Verify that surfaces are clean and dry according to water-repellent manufacturer's requirements. Check moisture content in three representative locations by method recommended by manufacturer.
 2. Verify that there is no efflorescence or other removable residues that would be trapped beneath the application of water repellent.
 3. Verify that required repairs are complete, cured, and dry before applying water repellent.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

1 3.2 PREPARATION

- 2 A. Cleaning: Before application of water repellent, clean substrate of substances that could impair penetration
3 or performance of product according to water-repellent manufacturer's written instructions and as follows:
4 1. Concrete Unit Masonry: Remove oil, curing compounds, laitance, and other substances that inhibit
5 penetration or performance of water repellents according to ASTM E 1857.
6 2. Natural Stone: As recommended by stone supplier.
7 B. Protect adjoining work, including mortar and sealant bond surfaces, from spillage or blow-over of water
8 repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water
9 repellent being deposited on surfaces. Cover live vegetation.

10 3.3 APPLICATION

- 11 A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate
12 before application of water repellent and to instruct Applicator on the product and application method to be
13 used.
14 B. Before applying, read "Preparation" and "Safety Information" sections in the Manufacturer's Product Data
15 Sheet for Weather Seal Blok-Guard® & Graffiti Control Ultra 15. Refer to the Product Data Sheet for
16 additional information about application of Blok-Guard® & Graffiti Control Ultra 15. Do not dilute or alter. Stir
17 thoroughly before use. Once opened, Blok-Guard® & Graffiti Control Ultra 15 must be used immediately.
18 C. Sprayer Application Instructions
19 1. Using low-pressure (less than 50 psi) spray equipment, saturate, "wet-on-wet" from the bottom up.
20 Avoid excessive overlapping.
21 2. Let the first application penetrate the masonry surface for 2 to 3 minutes.
22 3. Immediately brush out runs and drips to prevent buildup.
23 D. Brush or Roller Application Instructions
24 1. Thoroughly saturate the surface. Avoid excessive overlapping. Brush out runs and drip to prevent
25 buildup.
26 E. Heavily Textured and Porous Surface Application Instructions
27 1. Using low-pressure (less than 50 psi) spray equipment, saturate, "wet-on-wet" from the bottom up,
28 applying enough material to create a 6 to 8 inch rundown below the contact point while avoiding
29 excessive overlapping. Let the first application penetrate the masonry surface for 2 to 3 minutes.
30 Reapply in the same saturating manner to ensure complete coverage of recessed surfaces.
31 Immediately brush out runs and rips to prevent build up.
32 F. Dense, Smooth Surface Application Instructions
33 1. Apply enough in a single saturating application to completely wet the surface without creating drips,
34 puddles or rundown. Brush out or back roll all runs and drips for uniform appearance. DO NOT OVER
35 APPLY. One application is normally enough.
36 G. Second Coat Application Instructions
37 1. Apply the second coat as soon as the first coat is dry to touch, or within 2 hours of the first coat.
38 Immediately back roll or brush out runs and drips for a uniform appearance and to prevent buildup.
39 Allowing more than 2 hours between coats reduces effectiveness of the second coat.
40 H. Drying Time: Protect treated surfaces from rain for 4 to 6 hours. In normal weather (60 to 80 degrees
41 Fahrenheit at 50 percent humidity), Blok-Guard® & Graffiti Control Ultra 15 dries to the touch in about 25
42 minutes. Drying takes lower at lower temperatures. Product gains its water-repellency properties in 24 hours.
43 I. Graffiti Removal: Remove most types of graffiti with Defacer Eraser® Graffiti Wipe or Enviro Klean® SafStrip.
44 J. Clean-up: clean tools and equipment immediately with mineral spirits or an equivalent cleaning
45 solvent. Remove over spray and spills as soon as possible.

46 END OF SECTION 07 19 00

LOTYAN VAN HOOK DESTEFANO AND ARCHITECTS LLC
15 JULY 2017

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ISSUED FOR ADDENDUM #2
JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE
CONTRACT # 7952 MUNIS # 11471

SECTION 07 84 13
PENETRATION FIRESTOPPING

- 1
2
3 PART 1 - GENERAL
4 1.1 RELATED DOCUMENTS
5 1.2 SUMMARY
6 1.3 PREINSTALLATION MEETINGS
7 1.4 ACTION SUBMITTALS
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13 PART 2 - PRODUCTS
14 2.1 PERFORMANCE REQUIREMENTS
15 2.2 PENETRATION FIRESTOPPING SYSTEMS (FB-01, FB-02)
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17 2.4 FILL MATERIALS
18 PART 3 - EXECUTION
19 3.1 INSTALLATION
20 3.2 IDENTIFICATION
21 3.3 FIELD QUALITY CONTROL
- 22 PART 1 - GENERAL
23 1.1 RELATED DOCUMENTS
24 A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and
25 Division 01 Specification Sections, apply to this Section.
26 1.2 SUMMARY
27 A. Section Includes:
28 1. Penetrations in fire-resistance-rated walls.
29 2. Penetrations in horizontal assemblies.
30 1.3 PREINSTALLATION MEETINGS
31 A. Preinstallation Conference: Conduct conference at Project site.
32 1.4 ACTION SUBMITTALS
33 A. Product Data: For each type of product.
34 B. Sustainable Design Submittals:
35 1. Product Data: For sealants, indicating VOC content.
36 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting
37 materials.
38 C. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping
39 system, and design designation of qualified testing and inspecting agency.
40 1. Engineering Judgments: Where Project conditions require modification to a qualified testing and
41 inspecting agency's illustration for a particular penetration firestopping system, submit illustration,
42 with modifications marked, approved by penetration firestopping system manufacturer's fire-
43 protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain
44 approval of authorities having jurisdiction prior to submittal.
45 1.5 INFORMATIONAL SUBMITTALS
46 A. Qualification Data: For Installer.
47 B. Product test reports.
48 1.6 CLOSEOUT SUBMITTALS
49 A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in
50 compliance with requirements and manufacturer's written instructions.

1 1.7 QUALITY ASSURANCE

2 Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval
3 of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor
4 Program Requirement."

5 B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

6 1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities
7 having jurisdiction.

8 2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration
9 Firestopping" Article. Provide rated systems complying with the following requirements:

10 a. Penetration firestopping products bear classification marking of qualified testing and
11 inspecting agency.

12 b. Classification markings on penetration firestopping correspond to designations listed by the
13 following:

14 1) UL in its "Fire Resistance Directory."

15 C. Preinstallation Conference: Conduct conference at Project site.

16 1.8 PROJECT CONDITIONS

17 A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures
18 are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because
19 of rain, frost, condensation, or other causes.

20 B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of
21 ventilations or, where this is inadequate, forced-air circulation.

22 1.9 COORDINATION

23 A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed
24 according to specified requirements.

25 B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration
26 firestopping.

27 PART 2 - PRODUCTS

28 2.1 PERFORMANCE REQUIREMENTS

29 A. Fire-Test-Response Characteristics:

30 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities
31 having jurisdiction.

32 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated
33 systems complying with the following requirements:

34 a. Penetration firestopping systems shall bear classification marking of a qualified testing
35 agency.

36 1) UL in its "Fire Resistance Directory."

37 2) Intertek Group in its "Directory of Listed Building Products."

38 3) FM Global in its "Building Materials Approval Guide."

39 2.2 PENETRATION FIRESTOPPING SYSTEMS

40 A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases,
41 and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall
42 be compatible with one another, with the substrates forming openings, and with penetrating items if any.

43 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products
44 that may be incorporated into the Work include, but are not limited to the following:

45 a. 3M Fire Protection Products:

46 b. Hilti, Inc.

47 c. Tremco, Inc.

48 B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per
49 ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

50 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
51

- 1 C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per
2 ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
3 1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
4 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated
5 except for floor penetrations within the cavity of a wall.
6 3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when
7 tested according to UL 1479.
8 D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479,
9 based on testing at a positive pressure differential of 0.30-inch wg.
10 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative
11 total for any 100 sq. ft. at both ambient and elevated temperatures.
12 E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25
13 and 450, respectively, per ASTM E 84.
14 1. Sealant shall have a VOC content of 250 g/L or less.
15 F. Accessories: Provide components for each penetration firestopping system that are needed to install fill
16 materials and to maintain ratings required. Use only those components specified by penetration firestopping
17 system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
18 1. Permanent forming/damming/backing materials.
19 2. Substrate primers.
20 3. Collars.
21 4. Steel sleeves.

22 2.3 TELECOMMUNICATIONS AND ELECTRICAL APPLICATIONS

- 23 A. Cable Bundling Protection:
24 1. Composite Sheet (Intumescent): The intumescent sheet shall be capable of passing ASTM E 814
25 (ANSI/UL 1479) Standard Method of Fire Tests for Through-Penetration Fire Stops up to the desired
26 fire resistance rating.
27 2. Basis of Design: 3M CS-195+ Composite Sheet.
28 3. Systems Components:
29 a. Fire barrier caulk or putty.
30 b. Fire barrier wrap strip.
31 c. Graphite intumescent seal.
32 d. Sheet metal, anchors, washers and screws.
33 e. Cardboard.
34 4. Single Cable Tray - Wall (One and Two Hour Wall): Based on W-L-40004.
35 5. Single and Multiple Cable Trays – Concrete Floor (One and Two Hours): Based on C-AJ-4003.
36 6. Single Cable Tray – Concrete Curb Retrofit (One and Two Hours): Based on F-B-3004.

37 2.4 FILL MATERIALS

- 38 A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and
39 consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to
40 one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
41 B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to
42 moisture.
43 C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent
44 material sized to fit specific diameter of penetrant.
45 D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded
46 to galvanized-steel sheet.
47 E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic
48 fibers, or silicone compounds.
49 F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one
50 side.
51 G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and
52 lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous
53 mortar.
54 H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a
55 combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where
56 exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
57 I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in
58 place to produce a flexible, nonshrinking foam.
59

- 1 J. Silicone Sealants: Single component, silicone-based, neutral-curing elastomeric sealants of grade indicated
2 below:
3 1. Grade: Durable (self-leveling) formulation for openings in floors and other horizontal surfaces, and
4 nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits
5 use of nonsag grade for both opening conditions.

3 **PART 3 - EXECUTION**

7 **3.1 INSTALLATION**

- 8 A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening
9 configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
10 B. General: Install penetration firestopping systems to comply with manufacturer's written installation
11 instructions and published drawings for products and applications.
12 C. Install forming materials and other accessories of types required to support fill materials during their
13 application and in the position needed to produce cross-sectional shapes and details required to meet
14 fire ratings.
15 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials
16 and other accessories not forming permanent components of firestopping.
17 D. Install fill materials by proven techniques to produce the following results:
18 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to
19 achieve required fire-resistance ratings.
20 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
21 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth,
22 uniform surfaces that are flush with adjoining finishes.

23 **3.2 IDENTIFICATION**

- 24 A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE
25 AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and
26 with minimum 0.375-inch strokes.
27 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at
28 intervals not exceeding 30 feet.
29 B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels.
30 Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system
31 edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use
32 mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to
33 surfaces on which labels are placed. Include the following information on labels:
34 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any
35 Damage."
36 2. Contractor's name, address, and phone number.
37 3. Designation of applicable testing and inspecting agency.
38 4. Date of installation.
39 5. Manufacturer's name.
40 6. Installer's name.

41 **3.3 FIELD QUALITY CONTROL**

- 42 A. ~~Owner~~ Contractor will engage a qualified testing agency to perform tests and inspections according to
43 ASTM E 2174.
44 B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing,
45 repair or replace penetration firestopping system to comply with requirements.
46 C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports
47 are issued and installations comply with requirements.

48 **END OF SECTION**

SECTION 08 36 13

SECTIONAL DOORS

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
- 1.2 SUMMARY
- 1.3 ACTION SUBMITTALS
- 1.4 INFORMATIONAL SUBMITTALS
- 1.5 WARRANTY

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS, GENERAL
- 2.2 PERFORMANCE REQUIREMENTS
- 2.3 DOOR ASSEMBLY
- 2.4 MATERIALS, GENERAL
- 2.5 STEEL DOOR SECTIONS
- 2.6 TRACKS, SUPPORTS, AND ACCESSORIES
- 1.7 HARDWARE
- 2.8 COUNTERBALANCE MECHANISM
- 2.9 ELECTRIC DOOR OPERATORS
- 2.10 GENERAL FINISH REQUIREMENTS
- 2.11 STEEL AND GALVANIZED-STEEL FINISHES

PART 3 - EXECUTION

- 3.1 EXAMINATION
- 3.2 INSTALLATION
- 3.3 STARTUP SERVICES
- 3.4 ADJUSTING
- 3.5 DEMONSTRATION

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 electrically operated sectional doors.
- B. Related Requirements:
 - 1. Section 05 50 00 "Metal Fabrications" for miscellaneous steel supports.
 - 2. Section 11 12 00 "Parking Control Equipment" for parking control equipment interlocked to sectional doors.
 - 3. Section 28 10 00 "Access Control System" for access control system interlocked to sectional doors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type and size of sectional door and accessory.
 - 1. Include construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
 - 1. Include plans, elevations, sections, and mounting details.
 - 2. Include details of equipment assemblies. Indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
 - 4. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranties: For special warranties.

1.5. CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sectional doors 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 for both installation and maintenance of doors required for this Project.
B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
a. Structural failures including, but not limited to, excessive deflection.
b. Failure of any joints or operators before reaching required number of operation cycles.
c. Faulty operation of hardware.
d. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
e. Delamination of exterior or interior facing materials.
2. Warranty Period: Sections warranted for ten years against cracking, splitting or deterioration due to rust-through, and seven years against separation/degradation of foam insulation. Ten years on insulation value..

PART 2 - PRODUCTS

2.1. MANUFACTURERS, GENERAL

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Rite-Hite Corporation Steel-Rite Sectional Door with low Headroom or comparable product by one of the following:
1. Clopay Building Products.
2. Raynor.
3. Wayne-Dalton Corp.
B. Source Limitations: Obtain sectional doors from single source from single manufacturer.
1. Obtain operators and controls from sectional door manufacturer.

2.2. PERFORMANCE REQUIREMENTS

- A. General Performance: Sectional doors shall comply with performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction.
B. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.
1. Door shall meet or exceeds 15.2 psf windload per ANSI/DASMA 102-1996 standards in accordance with ASTM E-330-70.
2. Testing: According to ASTM E 330 or DASMA 108 for garage doors and complying with the acceptance criteria of DASMA 108.
3. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components.
a. Deflection of door sections in horizontal position (open) shall not exceed 1/120 of the door width.
b. Deflection of horizontal track assembly shall not exceed 1/240 of the door height.
4. Operability under Wind Load: Design overhead coiling doors to remain operable under design wind load, acting inward and outward.

2.3. DOOR ASSEMBLY

- A. Steel Sectional Door: Sectional door formed with hinged sections and fabricated according to DASMA 102 unless otherwise indicated.
B. Operation Cycles: Door components and operators capable of operating for not less than 100,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
C. Steel Sections: Zinc-coated (galvanized) steel sheet with zinc coating.
1. Section Thickness: 2 inches.
2. Exterior-Face, Steel Sheet Thickness: 24 gauge nominal coated thickness.
a. Surface: Flat.

- 1 3. Insulation: Board or foamed in place.
- 2 4. Interior Facing Material: 24 gauge Zinc-coated (galvanized) steel sheet.
- 3 D. Track Configuration: Low-headroom track torsion springs in front of track.
- 4 E. Roller-Tire Material: Track rollers shall be casehardened inner steel races with 10-ball bearing rollers.
- 5 F. Counterbalance Type: Torsion spring.
- 6 G. Electric Door Operator:
 - 7 1. Usage Classification: Heavy duty, 25 or more cycles per hour and more than 90 cycles per day.
 - 8 2. Operator Type: Jackshaft, side mounted.
 - 9 3. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use;
10 moving parts of operator enclosed or guarded if exposed and mounted at 8 feet or lower.
 - 11 4. Motor Exposure: Exterior, dusty, wet, or humid.
 - 12 5. Obstruction-Detection Device: Automatic photoelectric sensor.
 - 13 6. Control Station: Where indicated on Drawings. Refer to control specifications.
 - 14 7. Other Equipment: Refer to control specifications.
- 15 H. Door Finish:
 - 16 1. Baked-Enamel or Powder-Coat Finish: Color and gloss matching Architect's sample.
 - 17 2. Finish of Interior Facing Material: Match finish of exterior section face.

18 2.4 MATERIALS, GENERAL

- 19 A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified
20 testing agency, and marked for intended location and application.

21 2.5 STEEL DOOR SECTIONS

- 22 A. Exterior Section Faces and Frames: Zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet,
23 complying with ASTM A 653/A 653M, with indicated zinc coating and thickness.
 - 24 1. Fabricate section faces from single sheets to provide sections not more than 24 inches high and of
25 indicated thickness. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted,
26 shiplap, or tongue-in-groove weather-resistant seal, with a reinforcing flange return.
 - 27 2. For insulated doors, provide sections with continuous thermal-break construction, separating the
28 exterior and interior faces of door.
- 29 B. Section Ends and Intermediate Stiles: Enclose open ends of sections with channel end stiles formed from
30 galvanized-steel sheet not less than 0.064-inch-nominal coated thickness and welded to door section.
31 Provide intermediate stiles formed from not less than 0.064-inch-thick galvanized-steel sheet, cut to door
32 section profile, and welded in place. Space stiles not more than 48 inches apart.
- 33 C. Reinforce bottom section with a continuous channel or angle conforming to bottom-section profile and
34 allowing installation of astragal.
- 35 D. Provide reinforcement for hardware attachment.
- 36 E. Board Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard CFC-free
37 polystyrene or polyurethane board insulation, with maximum flame-spread and smoke-developed indexes
38 of 75 and 450, respectively, according to ASTM E 84; or with glass-fiber-board insulation. Secure insulation
39 to exterior face sheet. Enclose insulation completely within steel sections and the interior facing material,
40 with no exposed insulation.
- 41 F. Foamed-in-Place Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard
42 CFC-free polyurethane insulation, foamed in place to completely fill interior of section and pressure bonded
43 to face sheets to prevent delamination under wind load, and with maximum flame-spread and smoke-
44 developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely
45 within steel sections and the interior facing material, with no exposed insulation.
- 46 G. Interior Facing Material: Zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with
47 ASTM A 653/A 653M, with indicated thickness.
- 48 H. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp,
49 twist, and deformation.
50

- 1 2.6 TRACKS, SUPPORTS, AND ACCESSORIES
- 2 A. Tracks: Manufacturer's standard, 2 inches galvanized-steel track system of configuration indicated, sized
- 3 for door size and weight, designed for lift type indicated and clearances indicated on Drawings. Provide
- 4 complete system including brackets, bracing, and reinforcement to ensure rigid support of ball-bearing roller
- 5 guides for required door type, size, weight, and loading.
- 6 1. Galvanized Steel: ASTM A 653/A 653M, minimum G60 zinc coating.
- 7 2. Slope tracks at an angle from vertical or design tracks to ensure tight closure at jambs when door
- 8 unit is closed.
- 9 3. Track Reinforcement and Supports: Galvanized-steel members to support track without sag, sway,
- 10 and vibration during opening and closing of doors. Slot vertical sections of track spaced 24 inches
- 11 apart for door-drop safety device.
- 12 a. For Vertical Track: Continuous reinforcing angle attached to track and attached to wall with
- 13 jamb brackets.
- 14 b. For Horizontal Track: Continuous reinforcing angle from curve in track to end of track,
- 15 attached to track and supported at points by laterally braced attachments to overhead
- 16 structural members.
- 17 D. Weatherstripping: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible
- 18 vinyl, rubber, or neoprene fitted to bottom and top of sectional door unless otherwise indicated.
- 19 1. Deep interlocking joint seals between sections and flexible vinyl astragal on bottom edge. Track-
- 20 mounted side seal, rubber header seal and foam joint seal.
- 21 2.7 HARDWARE
- 22 A. General: Heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other
- 23 corrosion-resistant fasteners, to suit door type.
- 24 B. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.078-inch nominal coated thickness at each
- 25 end stile and at each intermediate stile, according to manufacturer's written recommendations for door size.
- 26 Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts.
- 27 Use rivets or self-tapping fasteners where access to nuts is impossible. Provide double-end hinges where
- 28 required, for doors more than 16 feet wide unless otherwise recommended by door manufacturer.
- 29 C. Rollers: Heavy-duty rollers with steel ball-bearings in case-hardened steel races, mounted with varying
- 30 projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required.
- 31 Provide 3-inch-diameter roller tires for 3-inch-wide track.
- 32 2.8 COUNTERBALANCE MECHANISM
- 33 A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from
- 34 steel-spring wire complying with ASTM A 229/A 229M, mounted on torsion shaft made of steel tube or solid
- 35 steel. Provide springs designed for number of operation cycles indicated.
- 36 B. Cables: Galvanized-steel, multi strand, lifting cables with cable safety factor of at least 7 to 1.
- 37 C. Cable Safety Device: Include a spring-loaded steel or spring-loaded bronze cam mounted to bottom door
- 38 roller assembly on each side and designed to automatically stop door if either lifting cable breaks.
- 39 D. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to
- 40 level the shaft and prevent sag.
- 41 E. Bumper: Provide spring bumper at each horizontal track to cushion door at end of opening operation.
- 42 2.9 ELECTRIC DOOR OPERATORS
- 43 A. Basis-of-Design Product: Subject to compliance with requirements, provide Chamberlain Group, Inc. (The
- 44 B. General: Electric door operator assembly of size and capacity recommended and provided by door
- 45 manufacturer for door and "operation cycles" requirement specified, with electric motor and factory-prewired
- 46 motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices,
- 47 integral gearing for locking door, and accessories required for proper operation.
- 48 1. Comply with NFPA 70.
- 49 2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70,
- 50 Class 2 control circuit, maximum 24-V ac or dc.
- 51 C. Usage Classification: Electric operator and components capable of operating for not less than number of
- 52 cycles per hour indicated for each door.
- 53 D. Door-Operator Type: Unit consisting of electric motor, gears, pulleys, belts, sprockets, chains, and controls
- 54 needed to operate door and meet required usage classification.
- 55 1. Jackshaft, Side Mounted: Jackshaft operator mounted on the inside front wall on right or left side of
- 56 door and connected to torsion shaft with an adjustable coupling or drive chain.
- 57 E. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated.
- 58 1. Electrical Characteristics:
- 59 a. Phase: [Single phase][Polyphase].

- 1 b. Volts: [115][208][230][460]<Insert value> V
2 c. Hertz: 60.
- 3 2. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate
4 door in either direction from any position, at a speed not less than 8 in./sec and not more than 12
5 in./sec., without exceeding nameplate ratings or service factor.
- 6 3. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's
7 standard unless otherwise indicated.
- 8 4. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices
9 with building electrical system and each location where installed.
- 10 5. Use adjustable motor-mounting bases for belt-driven operators.
- 11 F. Limit Switches: Equip motorized door with adjustable switches interlocked with motor controls and set to
12 automatically stop door at fully opened and fully closed positions.
- 13 G. Obstruction Detection Device: External entrapment protection consisting of indicated automatic safety
14 sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses
15 downward door travel.
- 16 1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door
17 opening without contact between door and obstruction.
- 18 a. Self-Monitoring Type: Designed to interface with door operator control circuit to detect
19 damage to or disconnection of sensing device. When self-monitoring feature is activated, door
20 closes only with sustained pressure on close button.
- 21 H. Emergency Manual Operation: Equip electrically powered door with capability for emergency manual
22 operation. Design manual mechanism so required force for door operation does not exceed 35 lbf.
- 23 I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for
24 automatically engaging manual operator and releasing brake for emergency manual operation while
25 disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor
26 level. Include interlock device to automatically prevent motor from operating when emergency operator is
27 engaged.
- 28 J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and
29 without affecting emergency manual operation.
- 30 K. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory
31 requirements for accessibility.

32 2.10 GENERAL FINISH REQUIREMENTS

- 33 A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-
34 06)" for recommendations for applying and designating finishes.
- 35 B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in
36 appearance of adjoining components are acceptable if they are within the range of approved Samples and
37 are assembled or installed to minimize contrast.

38 2.11 STEEL AND GALVANIZED-STEEL FINISHES

- 39 A. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and
40 thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment,
41 application, and minimum dry film thickness.

42 PART 3 - EXECUTION

43 3.1 EXAMINATION

- 44 A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for
45 substrate construction and other conditions affecting performance of the Work.
- 46 B. Examine locations of electrical connections.
- 47 C. Proceed with installation only after unsatisfactory conditions have been corrected.
48

- 1 3.2 INSTALLATION
- 2 A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts,
- 3 hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- 4 B. Tracks:
- 5 1. Fasten vertical track assembly to opening jambs and framing, spaced not more than 24 inches apart.
- 6 2. Hang horizontal track assembly from structural overhead framing with angles or channel hangers
- 7 attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and
- 8 reinforcement as required for rigid installation of track and door-operating equipment.
- 9 C. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with
- 10 regulatory requirements for accessibility.
- 11 D. Power-Operated Doors: Install automatic garage doors openers according to UL 325.
- 12 3.3 STARTUP SERVICES
- 13 A. Engage a factory-authorized service representative to perform startup services.
- 14 1. Complete installation and startup checks according to manufacturer's written instructions.
- 15 2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and
- 16 equipment.
- 17 3.4 ADJUSTING
- 18 A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or
- 19 distortion.
- 20 B. Lubricate bearings and sliding parts as recommended by manufacturer.
- 21 C. Adjust doors and seals to provide weather-resistant fit around entire perimeter.
- 22 D. Touch-up Painting: Immediately after welding galvanized materials, clean welds and abraded galvanized
- 23 surfaces and repair galvanizing to comply with ASTM A 780/A 780M.
- 24 3.5 DEMONSTRATION
- 25 A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust,
- 26 operate, and maintain sectional doors.

27 END OF SECTION 08 36 13

SECTION 08 42 29

SLIDING AUTOMATIC ENTRANCES

PART 1 - GENERAL

- 1.1 SUMMARY
- 1.2 DEFINITIONS
- 1.3 PERFORMANCE REQUIREMENTS
- 1.4 SUBMITTALS
- 1.5 QUALITY ASSURANCE
- 1.6 PROJECT CONDITIONS
- 1.7 COORDINATION
- 1.8 WARRANTY

PART 2 - PRODUCTS

- 2.1 MATERIALS
- 2.2 SLIDING AUTOMATIC ENTRANCES
- 2.3 ENTRANCE COMPONENTS
- 2.4 DOOR OPERATORS AND ACTIVATION AND SAFETY DEVICES
- 2.5 HARDWARE
- 2.6 FABRICATION
- 2.7 GENERAL FINISH REQUIREMENTS
- 2.8 ALUMINUM FINISHES

PART 3 - EXECUTION

- 1.1 EXAMINATION
- 1.2 INSTALLATION
- 1.3 ADJUSTING
- 1.4 CLEANING AND PROTECTION
- 1.5 DEMONSTRATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Exterior sliding, power-operated automatic entrances.
- B. Related Sections:
 - 1. Division 26 Sections for electrical connections including conduit and wiring for automatic entrance operators.

1.2 DEFINITIONS

- A. AAADM: American Association of Automatic Door Manufacturers.
- B. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.
- C. IBC: International Building Code.
- D. Safety Device: Device that, to avoid injury, prevents a door from opening or closing.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Automatic entrances shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.
 - 1. Wind Loads: 25 pounds per square foot.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. 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, ambient; 180 deg F material surfaces.
- C. Operating Temperature Range: Provide automatic entrances that operate within minus 20 to plus 122 deg F.
- D. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 1.25 cfm/sq. ft. of fixed entrance system area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft.

- 1 E. Opening-Force Requirements:
- 2 1. Power-Operated Doors: Not more than 50 lbf required to manually set door in motion if power fails,
3 and not more than 15 lbf required to open door to minimum required width.
- 4 2. Breakaway Device for Power-Operated Doors: Not more than 50 lbf required for a breakaway door
5 or panel to open.
- 6 3. Accessible Interior Doors: Not more than 5 lbf to fully open door.
- 7 F. Entrapment Force Requirements:
- 8 1. Power-Operated Sliding Doors: Not more than 30 lbf required to prevent stopped door from closing.
- 9 1.4 SUBMITTALS
- 10 A. Product Data: For each type of product indicated. Include construction details, material descriptions,
11 dimensions of individual components and profiles, and finishes for automatic entrances. Include rated
12 capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- 13 B. Shop Drawings: For automatic entrances. Include plans, elevations, sections, details, hardware mounting
14 heights, and attachments to other work.
- 15 1. Wiring Diagrams: For power, signal, and control wiring.
- 16 2. Activation and safety devices.
- 17 3. Include hardware schedule and indicate hardware types, functions, quantities, and locations.
- 18 C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- 19 D. Warranties: Sample of special warranties.
- 20 1.5 QUALITY ASSURANCE
- 21 A. Manufacturer Qualifications: A manufacturer with company certificate issued by AAADM.
- 22 B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for
23 installation and maintenance of units required for this Project and who employs a certified inspector.
- 24 C. Source Limitations for Automatic Entrances: Obtain automatic entrances from single source from single
25 manufacturer.
- 26 D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified
27 testing agency, and marked for intended location and application.
- 28 E. Power-Operated Door Standard: BHMA A156.10.
- 29 F. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for
30 automatic entrances serving as a required means of egress.
- 31 1.6 PROJECT CONDITIONS
- 32 A. Field Measurements: Verify actual dimensions of openings to receive automatic entrances by field
33 measurements before fabrication.
- 34 1.7 COORDINATION
- 35 A. Templates: Obtain templates for doors, frames, and other work specified to be factory prepared for installing
36 automatic entrances, and distribute to parties involved. Check Shop Drawings of other work to confirm that
37 adequate provisions are made for locating and installing automatic entrances to comply with indicated
38 requirements.
- 39 B. Coordinate hardware with doors, frames, and related work to ensure proper size, thickness, hand, function,
40 and finish. Coordinate hardware for automatic entrances with hardware required for rest of Project.
- 41 C. Electrical System Roughing-in: Coordinate layout and installation of automatic entrances with connections
42 to power supplies and access-control system.
- 43 1.8 WARRANTY
- 44 A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace
45 components of automatic entrances that fail in materials or workmanship within specified warranty period.
- 46 1. Failures include, but are not limited to, the following:
- 47 a. Structural failures including, but not limited to, excessive deflection.
- 48 b. Faulty operation of operators, controls, and hardware.
- 49 c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and
50 use.
- 51 2. Warranty Period: Two years from date of Substantial Completion.
- 52 B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace
53 components that show evidence of deterioration of factory-applied finishes within specified warranty period.
- 54 1. Deterioration includes, but is not limited to, the following:
- 55 a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
- 56 b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
- 57 c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
- 58 2. Warranty Period: 20 years from date of Substantial Completion.

1 PART 2 - PRODUCTS

2 2.1 MATERIALS

- 3 A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
- 4 1. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
- 5 2. Sheet and Plate: ASTM B 209.
- 6 B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS
- 7 Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation
- 8 methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable
- 9 SSPC standard.
- 10 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
- 11 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
- 12 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.
- 13 C. Stainless-Steel Bars: ASTM A 276 or ASTM A 666, Type 304.
- 14 D. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.
- 15 E. Glazing: 1/2 inch (13 mm) clear fully tempered monolithic float glass. Refer to Section 08 80 00 for quality
- 16 requirements.
- 17 F. Sealants and Joint Fillers: As specified in Division 7 Section "Joint Sealants."
- 18 G. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout; complying
- 19 with ASTM C 1107; of consistency suitable for application.
- 20 H. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except
- 21 containing no asbestos; formulated for 30-mil thickness per coat.
- 22 I. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding
- 23 fasteners and accessories compatible with adjacent materials.

24 2.2 SLIDING AUTOMATIC ENTRANCES

- 25 A. General: Provide manufacturer's standard automatic entrances including doors, sidelites, framing, headers,
- 26 carrier assemblies, roller tracks, door operators, activation and safety devices, and accessories required for
- 27 a complete installation.
- 28 B. Sliding Automatic Entrance:
- 29 1. Basis-of-Design Product: Horton series 2500 type 110 bi-parting O-SX-SX-O. Subject to compliance
- 30 with requirements, provide product by one of the following:
- 31 a. Biparting-Sliding Units:
- 32 1) Horton Automatics.
- 33 2) Stanley Dura-Glide 2000AG.
- 34 3) Besam Automated Entrance Systems, Inc.; an ASSA ABLOY Group company.
- 35 4) DORMA Automatics; Div. of DORMA Group North America.
- 36 2. Configuration: Biparting-sliding doors, with two sliding leaves and sidelites on each side with transom
- 37 as indicated.
- 38 a. Traffic Pattern: Two way.
- 39 b. Emergency Breakaway Capability: Sliding leaves only.
- 40 c. Mounting: Between jambs.
- 41 3. Operator Features:
- 42 a. Power opening and closing.
- 43 b. Drive System: belt.
- 44 c. Adjustable opening and closing speeds.
- 45 d. Adjustable hold-open time between 0 and 30 seconds.
- 46 e. Obstruction recycle.
- 47 f. On-off/hold-open switch to control electric power to operator, key operated.
- 48 g. Energy-conservation switch that reduces door-opening width.
- 49 4. Sliding Door Carrier Assemblies and Overhead Roller Tracks: Manufacturer's standard carrier
- 50 assembly that allows vertical adjustment; consisting of nylon- or delrin-covered, ball-bearing-center
- 51 steel wheels operating on a continuous roller track, or ball-bearing-center steel wheels operating on
- 52 a nylon- or delrin-covered, continuous roller track. Support doors from carrier assembly by cantilever
- 53 and pivot assembly.
- 54 a. Rollers: Minimum of two ball-bearing roller wheels and two anti-rise rollers for each active
- 55 leaf.
- 56 5. Sliding Door Threshold: Manufacturer's standard threshold members and bottom-guide track
- 57 system, with stainless-steel, ball-bearing-center roller wheels.
- 58 6. Combination Activation and Safety Device: Combination motion/presence sensor.
- 59 7. Sidelite Safety Device: Presence sensor, mounted above each sidelite on side of door opening
- 60 through which doors travel, to detect obstructions and to prevent door from opening.
- 61

- 1 8. Finish: Finish framing, door(s), sidelite(s), and header with finish matching adjacent storefront.
 2 a. Vestibule automatic entrance door shall have two color fluoropolymer paint finish. Exterior
 3 finish to match aluminum finish of storefront framing. Interior finish shall be same as exterior.
- 4 **2.3 ENTRANCE COMPONENTS**
- 5 A. Framing members: Manufacturer's standard extruded aluminum, minimum 0.125 inch thick and reinforced
 6 as required to support imposed loads.
 7 1. Nominal Size: As indicated on Drawings.
 8 2. Extruded Glazing Stops and Applied Trim: Minimum 0.062-inch wall thickness.
- 9 B. Sidelite(s): Manufacturer's standard 1-3/4-inch-deep sidelite(s) with minimum 0.125-inch-thick, extruded-
 10 aluminum tubular stile and rail members matching door design and finish.
 11 1. Glazing Stops and Gaskets: Same materials and design as for stile and rail door.
 12 2. Muntin Bars: Horizontal tubular rail members for each sidelite; match stile design.
- 13 C. Headers: Fabricated from minimum 0.125-inch-thick, extruded aluminum and extending full width of
 14 automatic entrance units to conceal door operators and controls. Provide hinged or removable access
 15 panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized
 16 access.
 17 1. Mounting: Concealed, with one side of header flush with framing.
 18 2. Capacity: Capable of supporting doors up to 175 lb per leaf over spans up to 14 feet without
 19 intermediate supports.
 20 a. Provide sag rods for spans exceeding 14 feet.
- 21 D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining,
 22 nonferrous shims for aligning system components.
- 23 E. Signage: Affixed to both sides of each door as required by BHMA A156.10 for type of door and its operation.
 24 1. Provide sign materials with instructions for field application after glazing is installed.
- 25 **2.4 DOOR OPERATORS AND ACTIVATION AND SAFETY DEVICES**
- 26 A. Door Operators: Provide door operators of size recommended by manufacturer for door size, weight, and
 27 movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic
 28 load for type of occupancy indicated.
 29 1. Door Operator Performance: Provide door operators that will open and close doors and maintain
 30 them in fully closed position when subjected to Project's design wind loads.
 31 2. Electromechanical Operators: Concealed, self-contained, overhead unit powered by fractional-
 32 horsepower, permanent-magnet dc motor; with closing speed controlled mechanically by gear train
 33 and dynamically by braking action of electric motor; with solid-state microprocessor controller;
 34 UL 325; and with manual operation with power off.
- 35 B. Combination Motion/Presence Sensors: Self-contained units; consisting of both motion and presence
 36 sensors in a single metal or plastic housing; adjustable to provide detection field sizes and functions required
 37 by BHMA A156.10.
 38 1. Motion Sensor: K-band-frequency, microwave-scanner units; with relay hold time of not less than 2
 39 to 10 seconds.
 40 2. Presence Sensor: Infrared-scanner units; with relay hold time of not less than 2 to 10 seconds.
 41 Sensors shall remain active at all times.
- 42 C. Photoelectric Beams: Pulsed infrared, sender-receiver assembly for recessed mounting. Beams shall not
 43 be active when doors are fully closed.
- 44 D. Key Switch: Recess-mounted, door control switch with key-controlled actuator; enclosed in 2-by-4-inch
 45 junction box. Provide faceplate engraved with letters indicating switch functions.
 46 1. Face-Plate Material: Painted metal as selected by Architect from manufacturer's full range.
 47 2. Functions: On-off, momentary contact.
 48 3. Mounting: Recess mounted in door jamb.
- 49 **2.5 HARDWARE**
- 50 A. General: Provide units in sizes and types recommended by automatic entrance and hardware
 51 manufacturers for entrances and uses indicated. Finish exposed parts to match door finish.
- 52 B. Breakaway Device for Power-Operated Doors: Provide breakaway device that allows door to swing out in
 53 direction of egress to full 90 degrees from any operating position. Maximum force to open door shall be 50
 54 lbf according to BHMA A156.10. Interrupt powered operation of door operator while in breakaway mode.
- 55 C. Automatic Locking for Sliding Door: Electrically controlled device mounted in header that automatically locks
 56 door against sliding when in closed position. Provide fail secure operation if power fails.
 57 1. Include concealed, vertical-rod exit devices, UL 305, with latching into threshold and overhead carrier
 58 assembly and released by full-width panic bar; and that prevent emergency breakaway doors from
 59 swinging and that permit emergency egress.
 60

- 1 D. Weather Stripping: Manufacturer's standard replaceable components.
2 1. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or
3 aluminum-strip backing.

4 **2.6 FABRICATION**

- 5 A. General: Factory fabricate automatic entrance components to designs, sizes, and thicknesses indicated
6 and to comply with indicated standards.
7 1. Form aluminum shapes before finishing.
8 2. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of
9 finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
10 3. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use
11 countersunk Phillips flat-head machine screws, finished to match framing.
12 a. Where fasteners are subject to loosening or turning out from thermal and structural
13 movements, wind loads, or vibration, use self-locking devices.
14 b. Reinforce members as required to receive fastener threads.
15 4. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact
16 surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
17 B. Framing: Provide automatic entrances as prefabricated assemblies. Complete fabrication, assembly,
18 finishing, hardware application, and other work before shipment to Project site.
19 1. Fabricate tubular and channel frame assemblies with manufacturer's standard welded or mechanical
20 joints. Provide subframes and reinforcement as required for a complete system to support required
21 loads.
22 2. Perform fabrication operations in manner that prevents damage to exposed finish surfaces.
23 3. Form profiles that are sharp, straight, and free of defects or deformations.
24 4. Provide components with concealed fasteners and anchor and connection devices.
25 5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline
26 joints free of burrs and distortion.
27 6. Fabricate exterior components to drain water passing joints and condensation and moisture occurring
28 or migrating within system to the exterior.
29 7. Provide anchorage and alignment brackets for concealed support of assembly from building
30 structure.
31 8. Allow for thermal expansion of exterior units.
32 C. Doors: Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed
33 loads and for installing hardware.
34 D. Door Operators: Factory fabricated and installed in headers, including adjusting and testing.
35 E. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing
36 indicated, according to GANA's "Glazing Manual."
37 F. Hardware: Factory install hardware to greatest extent possible; remove only as required for final finishing
38 operation and for delivery to and installation at Project site. Cut, drill, and tap for factory-installed hardware
39 before applying finishes.

40 **2.7 GENERAL FINISH REQUIREMENTS**

- 41 A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations
42 for applying and designating finishes.
43 B. Apply organic finishes to formed metal after fabrication unless otherwise indicated.

44 **2.8 ALUMINUM FINISHES**

- 45 A. High-Performance Organic Finish: Two or three-coat fluoropolymer finish complying with AAMA 2605 and
46 containing not less than 70 percent PVDF resin by weight in color coats. Prepare, pretreat, and apply coating
47 to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
48 1. Color and Gloss: To match curtain wall system finish and color.
49

1 PART 3 - EXECUTION

2 3.1 EXAMINATION

- 3 A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances,
4 header support, and other conditions affecting performance of automatic entrances.
5 B. Proceed with installation only after unsatisfactory conditions have been corrected.

6 3.2 INSTALLATION

- 7 A. General: Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and
8 distortion. Rigidly secure nonmovement joints. Seal joints watertight.
9 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact
10 surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
11 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact
12 surfaces with bituminous paint.
13 B. Thresholds: Install automatic entrances plumb and true in alignment with established lines and grade
14 without warp or rack of framing members and doors. Anchor securely in place.
15 C. Door Operators: Connect door operators to electrical power distribution system as specified in
16 Division 16 Sections.
17 D. Access-Control Devices: Connect access-control devices to access-control system as specified in
18 Division 16 Sections.
19 E. Activation and Safety Devices: Install and adjust devices to provide detection field and functions indicated.
20 F. Glazing: Install glazing as specified in Division 8 Section "Glazing."
21 G. Sealants: Comply with requirements specified in Division 7 Section "Joint Sealants" to provide weathertight
22 installation.
23 1. Set thresholds, bottom-guide track system, framing members and flashings in full sealant bed.
24 2. Seal perimeter of framing members with sealant.
25 H. Signage: Apply signage on both sides of each door as required by referenced door standards.
26 I. Wiring within Automatic Entrance Enclosures: Bundle, lace, and train conductors to terminal points with no
27 excess and without exceeding manufacturer's written limitations on bending radii. Provide and use lacing
28 bars and distribution spools.

29 3.3 ADJUSTING

- 30 A. Adjust door operators, controls, and hardware for smooth and safe operation and for weathertight closure;
31 comply with requirements in BHMA A156.10.
32 B. Lubricate operating hardware and other moving parts as recommended by manufacturer.
33 C. Readjust door operators and controls after repeated operation of completed installation equivalent to 3 days'
34 use by normal traffic (100 to 300 cycles). Lubricate hardware, operating equipment, and other moving parts.
35 D. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-
36 site assistance in adjusting system to suit actual occupied conditions.

37 3.4 CLEANING AND PROTECTION

- 38 A. Clean glass and metal surfaces promptly after installation. Remove excess glazing and sealant compounds,
39 dirt, and other substances. Repair damaged finish to match original finish.

40 3.5 DEMONSTRATION

- 41 A. Engage a certified inspector to train Owner's maintenance personnel to adjust, operate, and maintain
42 automatic entrances.
43

END OF SECTION

SECTION 08 44 23

STRUCTURAL-SEALANT-GLAZED CURTAIN WALLS

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
- 1.2 SUMMARY
- 1.3 PREINSTALLATION MEETINGS
- 1.4 ACTION SUBMITTALS
- 1.5 INFORMATIONAL SUBMITTALS
- 1.6 QUALITY ASSURANCE
- 1.7 WARRANTY

PART 2 - PRODUCTS

- 2.1 PERFORMANCE REQUIREMENTS
- 2.2 MANUFACTURERS
- 2.3 FRAMING
- 2.4 ENTRANCES
- 2.5 GLAZING
- 2.6 ACCESSORIES
- 2.7 FABRICATION
- 2.8 ALUMINUM FINISHES

PART 3 - EXECUTION

- 3.1 EXAMINATION
- 3.2 PREPARATION
- 3.3 INSTALLATION
- 3.4 ERECTION TOLERANCES
- 3.5 FIELD QUALITY CONTROL

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. Field-glazed, four-sided structural-sealant-glazed curtain-wall assemblies.
- B. Related Requirements:
 - 1. Section 08 41 13 "Aluminum Framed Entrances and Storefronts" for conventionally glazed aluminum framing.
 - 2. ~~Section 08 44 13 "Glazed Aluminum Curtain Walls" for conventionally glazed curtain walls.~~

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For structural-sealant-glazed curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.
 - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 - 2. Include full-size isometric details of each vertical-to-horizontal intersection of structural-sealant-glazed curtain walls, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.

ISSUED FOR ADDENDUM #2

JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE

CONTRACT # 7952 MUNIS # 11471

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STRUCTURAL-SEALANT-GLAZED CURTAIN WALLS

- 2 e. Flashing and drainage.
- 3 3. Show connections for continuity with adjacent thermal, weather, air, and vapor barriers.
- 4 C. Samples for Field Testing: For each type of exposed finish specified, in manufacturer's standard sizes.
- 5 D. Fabrication Details: For each vertical-to-horizontal intersection of assemblies, made from 12-inch glass and
- 6 full-size components and showing details of the following:
- 7 1. Joinery, including concealed welds.
- 8 2. Anchorage.
- 9 3. Expansion provisions.
- 10 4. Glazing.
- 11 5. Flashing and drainage.
- 12 E. Delegated-Design Submittal: For structural-sealant-glazed curtain walls indicated to comply with
- 13 performance requirements and design criteria, including analysis data signed and sealed by the qualified
- professional engineer responsible for their preparation.

14 1.5 MATERIALS AND SUBMITTALS

- 15 A. Energy Performance Certificates: For structural-sealant-glazed curtain walls, accessories, and components
- 16 from manufacturer.
- 17 1. Basis for Certification: NFRC-certified energy performance values for each structural-sealant-glazed
- 18 curtain wall.
- 19 B. Product Test Reports: For structural-sealant-glazed curtain walls, for tests performed by manufacturer and
- 20 witnessed by a qualified testing agency.
- 21 C. Sample Warranties: For special warranties.

22 1.6 QUALITY ASSURANCE

- 23 A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by
- 24 manufacturer.
- 25 B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated and accredited by
- 26 IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025.
- 27 C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic
- 28 effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions,
- 29 arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one
- 30 another, and to adjoining construction.
- 31 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's
- 32 approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.
- 33 D. Structural-Sealant Glazing: Comply with ASTM C 1401 for design and installation of curtain-wall assemblies.

34 1.7 WARRANTY

- 35 A. Special Warranty: Manufacturer agrees to repair or replace components of glazed aluminum curtain wall
- 36 that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
- 37 1. Failures include, but are not limited to, the following:
- 38 a. Structural failures including, but not limited to, excessive deflection.
- 39 b. Noise or vibration created by wind and thermal and structural movements.
- 40 c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- 41 d. Water penetration through fixed glazing and framing areas.
- 42 e. Failure of operating components.
- 43 2. Warranty Period: 10 years from date of Substantial Completion.
- 44 B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum
- 45 that shows evidence of deterioration of factory-applied finishes within specified warranty period.
- 46 1. Deterioration includes, but is not limited to, the following:
- 47 a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
- 48 b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
- 49 c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
- 50 2. Warranty Period: 20 years from date of Substantial Completion.
- 51

1 PART 2 - PRODUCTS

2 2.1 PERFORMANCE REQUIREMENTS

- 3 A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality
4 Requirements," to design aluminum-framed entrances and storefronts.
- 5 B. General Performance: Comply with performance requirements specified, as determined by testing of
6 structural-sealant-glazed curtain walls representing those indicated for this Project without failure due to
7 defective manufacture, fabrication, installation, or other defects in construction.
- 8 1. Structural-sealant-glazed curtain walls shall withstand movements of supporting structure including,
9 but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly
10 distributed and concentrated live loads.
- 11 2. Failure also includes the following:
- 12 a. Thermal stresses transferring to building structure.
- 13 b. Glass breakage.
- 14 c. Noise or vibration created by wind and thermal and structural movements.
- 15 d. Loosening or weakening of fasteners, attachments, and other components.
- 16 e. Failure of operating units.
- 17 C. Structural Loads:
- 18 1. Wind Loads: 40 psf.
- 19 2. Other Design Loads: As indicated on Drawings.
- 20 D. Deflection of Framing Members: At design wind pressure, as follows:
- 21 1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and
22 to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts
23 edge deflection of individual glazing lites to 3/4 inch, whichever is less.
- 24 2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite
25 to less than 75 percent of design dimension and that which reduces edge clearance between framing
26 members and glazing or other fixed components to less than 1/8 inch.
- 27 a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and
28 operable units.
- 29 3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:
- 30 a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4-inch for spans
31 greater than 11 feet 8-1/4 inches or 1/175 times span, for spans less than 11 feet 8-1/4 inches.
- 32 E. Structural: Test according to ASTM E 330 as follows:
- 33 1. When tested at positive and negative wind-load design pressures, assemblies do not evidence
34 deflection exceeding specified limits.
- 35 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies,
36 including anchorage, do not evidence material failures, structural distress, or permanent deformation
37 of main framing members exceeding 0.2 percent of span.
- 38 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- 39 F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
- 40 1. Fixed Framing and Glass Area:
- 41 a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft..
- 42 G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
- 43 1. No evidence of water penetration through fixed glazing and framing areas when tested according to
44 a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not
45 less than 15 lbf/sq. ft.
- 46
- 47 H. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 when tested with pressures as
48 per G.1., above:
- 49
- 50 I. Interstory Drift: Accommodate design displacement of adjacent stories indicated.
- 51 1. Design Displacement: As indicated on Drawings.
- 52 2. Test Performance: Complying with criteria for passing based on building occupancy type when tested
53 according to AAMA 501.4 at design displacement and 1.5 times the design displacement.
- 54 J. Energy Performance: Certify and label energy performance according to NFRC as follows:
- 55 1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more
56 than 0.36 Btu/sq. ft. x h x degree F as determined according to NFRC 100.
- 57 2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient
58 of no greater than 0.40] as determined according to NFRC 200.
- 59 3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified
60 condensation resistance rating of no less than 60 as determined according to NFRC 500.

ISSUED FOR ADDENDUM #2

JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE

CONTRACT # 7952 MUNIS # 11471

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STRUCTURAL-SEALANT-GLAZED CURTAIN
WALLS

- 1 K. Thermal Movements: Allow for thermal movement resulting from ambient and surface temperature
2 changes:
3 1. Temperature Change: 130 degree F, ambient; 180 degree F, material surfaces.
4 2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors,
5 and fasteners; or reduction of performance when tested according to AAMA 501.5.
6 a. High Exterior Ambient-Air Temperature: That which produces an exterior metal surface
7 temperature of 110 degree F.
8 b. Low Exterior Ambient-Air Temperature: -10 degree F.
- 9 L. Structural-Sealant Joints:
10 1. Designed to carry gravity loads of glazing.
11 2. Designed to produce tensile or shear stress of less than 20 psi.
- 12 M. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed
13 curtain walls without failing adhesively or cohesively. When tested for preconstruction adhesion and
14 compatibility, cohesive failure of sealant shall occur before adhesive failure.
15 1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material
16 behind.
17 2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each
18 substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.
- 19 2.2 MANUFACTURERS
20 A. Source Limitations: Obtain all components of curtain-wall system, including framing and accessories, from
21 single manufacturer.
22 B. Basis of Design: Oldcastle Building Envelope Reliance Cassette – 4- sided structurally glazed system.
23 1. Approved Equal Product: Kawneer Clearwall.
24 C. Design:
25 1. Shop glazed infill onto frames structural glazing tape or structural silicone. The pre-glazed frames
26 are field applied to a structural grid of curtain wall framing. Overall system depth as indicated or
27 required.
28 2. The system shall include thermally improved door framing adaptors. Provide exterior face caps as
29 detailed.
- 30 2.3 FRAMING
31 A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required
32 and reinforced as required to support imposed loads.
33 1. Glazing System: Retained with structural sealant on four sides.
34 2. Finish: High-performance organic finish.
35 3. Fabrication Method: Either factory- or field-fabricated system.
36 B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining,
37 nonferrous shims for aligning system components.
38 C. Materials:
39 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
40 a. Sheet and Plate: ASTM B 209.
41 b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
42 c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
43 d. Structural Profiles: ASTM B 308/B 308M.
- 44 2.4 ENTRANCES
45 A. Entrances: Comply with Section 08 41 13 "Aluminum-Framed Entrances and Storefronts."
46 a. Structural Profiles: ASTM B 308/B 308M.
- 47 2.5 GLAZING
48 A. Glazing: Comply with Section 08 80 00 "Glazing."
49 B. Structural Glazing Sealants (SEALANT-6): ASTM C 1184, chemically curing silicone formulation that is
50 compatible with system components with which it comes in contact, specifically formulated and tested for
51 use as structural sealant and approved by structural-sealant manufacturer for use in curtain-wall assembly
52 indicated.
53 1. Color: As selected by Architect from manufacturer's full range of colors.
54 C. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically
55 curing silicone formulation that is compatible with structural sealant and other system components with which
56 it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed
57 curtain-wall manufacturers for this use.

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JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE

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STRUCTURAL-SEALANT-GLAZED CURTAIN
WALLS

- 1 1. Color: Match structural sealant.
2 D. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L or less.
- 3 2.6 ACCESSORIES
4 A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding
5 fasteners and accessories compatible with adjacent materials.
6 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and
7 structural movements, wind loads, or vibration.
8 2. Reinforce members as required to receive fastener threads.
9 B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication
10 and installation tolerances in material and finish compatible with adjoining materials and recommended by
11 manufacturer.
12 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts
13 complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- 14 2.7 FABRICATION
15 A. Form or extrude aluminum shapes before finishing.
16 B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish.
17 Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
18 C. Fabricate components that, when assembled, have the following characteristics:
19 1. Profiles that are sharp, straight, and free of defects or deformations.
20 2. Accurately fitted joints with ends coped or mitered.
21 3. Physical and thermal isolation of glazing from framing members.
22 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required
23 glazing edge clearances.
24 5. Provisions for field replacement of glazing from exterior.
25 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
26 D. Factory-Assembled Frame Units:
27 1. Four side structural glazing is to be in-factory controlled galzing.
28 2. Rigidly secure nonmovement joints.
29 3. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's
30 written instructions, to ensure compatibility and adhesion.
31 4. Preparation includes, but is not limited to, cleaning and priming surfaces.
32 5. Seal joints watertight unless otherwise indicated.
33 6. Install glazing to comply with requirements in Section 08 80 00 "Glazing." Four sided structural
34 glazed units must be factory glazed.
35 E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
- 36 2.8 ALUMINUM FINISHES
37 A. High-Performance Organic Finish (AL-1): Two coat fluoropolymer finish complying with AAMA 2605 and
38 containing not less than 70 percent PVDF or FEVE resin by weight. Prepare, pretreat, and apply coating to
39 exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
40 1. Color and Gloss: to match PPG Duranar Sunstorm Pewter (UC 110227F).
- 41 PART 3 - EXECUTION
- 42 3.1 EXAMINATION
43 A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other
44 conditions affecting performance of the Work.
45 B. Proceed with installation only after unsatisfactory conditions have been corrected.
- 46 3.2 PREPARATION
47 A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written
48 instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and
49 priming surfaces.
- 50 3.3 INSTALLATION
51 A. General:
52 1. Comply with manufacturer's written instructions.

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JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE

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STRUCTURAL-SEALANT-GLAZED CURTAIN
WALLS

- 1 2. Do not install damaged components.
- 2 3. Fit joints to produce hairline joints free of burrs and distortion.
- 3 4. Rigidly secure nonmovement joints.
- 4 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration
- 5 and to prevent impeding movement of moving joints.
- 6 6. Where welding is required, weld components in concealed locations to minimize distortion or
- 7 discoloration of finish. Protect glazing surfaces from welding.
- 8 7. Seal joints watertight unless otherwise indicated.
- 9 B. Metal Protection:
- 10 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting
- 11 contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as
- 12 recommended by manufacturer for this purpose.
- 13 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact
- 14 surfaces with bituminous paint.
- 15 C. Install components plumb and true in alignment with established lines and grades.
- 16 D. Install operable units level and plumb, square by end view, and without distortion. Adjust weather-stripping
- 17 and hardware movement to produce proper operation.
- 18 E. Install glazing as specified in Section 08 80 00 "Glazing."
- 19 1. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's
- 20 written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to,
- 21 cleaning and priming surfaces.
- 22 F. Install weather seal sealant according to Section 07 92 00 "Joint Sealants" and according to sealant
- 23 manufacturer's written instructions, to produce weatherproof joints. Install joint filler behind sealant as
- 24 recommended by sealant manufacturer.

25 3.4 ERECTION TOLERANCES

- 26 A. Erection Tolerances: Install structural-sealant-glazed curtain walls to comply with the following maximum
- 27 tolerances:
- 28 1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
- 29 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
- 30 3. Alignment:
- 31 a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch
- 32 wide, limit offset from true alignment to 1/16 inch.
- 33 b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit
- 34 offset from true alignment to 1/8 inch.
- 35 c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit
- 36 offset from true alignment to 1/4 inch.
- 37 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

38 3.5 FIELD QUALITY CONTROL

- 39 A. Testing Agency: Owner Contractor will engage a qualified testing agency to perform tests and inspections.
- 40 B. Test Area: Perform tests on one bay at least 30 feet, by one story.
- 41 C. Field Quality-Control Testing: Perform the following test on representative areas of structural-sealant-glazed
- 42 curtain walls.
- 43 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect
- 44 shall be tested according to AAMA 501.2 and shall not evidence water penetration.
- 45 a. Perform tests in each test area as directed by Architect.
- 46 2. Air Infiltration: ASTM E 783 at 1.5 times the rate specified for laboratory testing in "Performance
- 47 Requirements" Article but not more than 0.50 cfm/sq. ft..
- 48 a. Perform tests in each test area as directed by Architect.
- 49 3. Water Penetration: ASTM E 1105 at a minimum uniform static-air-pressure differential of 0.67 times
- 50 the static-air-pressure differential specified for laboratory testing in "Performance Requirements"
- 51 Article, but not less than 6.24 lbf/sq. ft., and shall not evidence water penetration.
- 52 D. Structural-Sealant Adhesion: Test structural sealant according to recommendations in ASTM C 1401,
- 53 Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2 and Shop Glazing Considerations.
- 54 1. Test a minimum of one area on each building facade.
- 55 2. Repair installation areas damaged by testing.
- 56 E. Structural-sealant-glazed curtain walls will be considered defective if they do not pass tests and inspections.
- 57 F. Prepare test and inspection reports.

58

END OF SECTION 08 44 23

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STRUCTURAL-SEALANT-GLAZED CURTAIN

WALLS

SECTION 08 88 53
SECURITY GLAZING

- 1
- 2
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- 4 1.1 RELATED DOCUMENTS
- 5 1.2 SUMMARY
- 6 1.3 COORDINATION
- 7 1.4 ACTION SUBMITTALS
- 8 1.5 INFORMATIONAL SUBMITTALS
- 9 1.7 WARRANTY
- 10 PART 2 - PRODUCTS
- 11 2.1 SECURITY FRAME
- 12 2.2 GLASS PRODUCTS
- 13 2.3 LAMINATED GLASS SECURITY GLAZING
- 14 2.4 GLAZING SEALANTS
- 15 2.5 GLAZING TAPES
- 16 2.6 MISCELLANEOUS GLAZING MATERIALS
- 17 2.6 FABRICATION OF SECURITY GLAZING
- 18 PART 3 - EXECUTION
- 19 3.1 GLAZING, GENERAL
- 20 3.2 TAPE GLAZING
- 21 3.3 SEALANT GLAZING (WET)
- 22 3.4 CLEANING AND PROTECTION

23 PART 1 - GENERAL

- 24 1.1 **RELATED DOCUMENTS**
- 25 A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and
- 26 Division 01 Specification Sections, apply to this Section.
- 27 1.2 **SUMMARY**
- 28 A. Section includes forced entry security laminated glass.
- 29 B. Transaction window framing.
- 30 1.3 **COORDINATION**
- 31 A. Coordinate glazing channel dimensions to provide necessary bite on security glazing, minimum edge and
- 32 face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- 33 1.4 **ACTION SUBMITTALS**
- 34 A. Product Data: For each type of product.
- 35 B. Sustainable Design Submittals:
- 36 1. Product Data: For sealants, indicating VOC content.
- 37 C. Security Glazing Samples: For each type of security glazing; 12 inches square.
- 38 Security Glazing Schedule: List security glazing types and thicknesses for each size opening and location.
- 39 Use same designations indicated on Drawings. Indicate coordinated dimensions of security glazing and
- 40 construction that receives security glazing, including clearances and glazing channel dimensions.
- 41 1.5 **INFORMATIONAL SUBMITTALS**
- 42 A. Product Test Reports: For each type of security glazing, for tests performed by a qualified testing agency.
- 43 1.6 **WARRANTY**
- 44 A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer agrees to replace laminated glass that
- 45 deteriorates within specified warranty period. Deterioration of laminated glass is defined as defects
- 46 developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated
- 47 glass contrary to manufacturer's written instructions. Defects include edge separation, delamination
- 48 materially obstructing vision through glass, and blemishes exceeding those allowed by referenced
- 49 laminated-glass standard:
- 50 1. Warranty Period: 10 years from date of Substantial Completion.

1 **PART 2 - PRODUCTS**

2 **2.1 SECURITY FRAMES**

- 3 A. Transaction Window Framing: Interbank X QS-T4-A-4836 or equal.

4 **2.2 GLAZING PRODUCTS**

- 5 A. Heat Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
6 B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of
7 kind and condition indicated.

8 **2.3 LAMINATED-GLASS SECURITY GLAZING**

- 9 A. Security Glazing (Type SGL-1): Clear laminated glass.
10 1. Products: Subject to compliance with requirements, available products that may be incorporated into
11 the Work include, but are not limited to, the following:
12 2. Basis for design Oldcastle BuildingEnvelope® ArmorProtect® Item #121070.
13 3. Type SG-FE1 - Glass-clad polycarbonate. Glass outer and inner lites shall be 3 mm heat
14 strengthened glass with a single ply polycarbonate core. Overall nominal thickness shall be 7/16
15 inch. Product shall comply with:
16 a. NFPA-704, Forced Entry Level 1 and Ballistics Level A, .38 Special (ballistics stoppage
17 spall penetration)

18 **2.4 GLAZING SEALANTS**

- 19 A. General:
20 1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials
21 they contact, including security glazing, seals of insulating security glazing and air-gap security
22 glazing, and glazing channel substrates, under conditions of service and application, as
23 demonstrated by sealant manufacturer based on testing and field experience.
24 2. Suitability: Comply with sealant and security glazing manufacturers' written instructions for selecting
25 glazing sealants suitable for applications indicated and for conditions existing at time of installation.
26 3. Sealant shall have a VOC content of 250 g/L or less.
27 4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
28 B. Security Sealant: Manufacturer's standard, nonsag, tamper-resistant sealant for joints with low movement
29 complying with ASTM C 920, Grade NS, Class 12.5 or 25, Use NT, and with a Shore A hardness of at least
30 45 when tested according to ASTM C 661.
31 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products
32 that may be incorporated into the Work include, but are not limited to the following:
33 a. BASF Corporation; Construction Systems.
34 b. Pecora Corporation.

35 **2.5 GLAZING TAPES:**

- 36 A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape;
37 nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as
38 recommended in writing by tape and security glazing manufacturers for application indicated; and complying
39 with ASTM C 1281 and AAMA 800 for products indicated below:
40 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
41 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

42 **2.6 MISCELLANEOUS GLAZING MATERIALS**

- 43 A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
44 B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
45 C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by security glazing manufacturer
46 to maintain security glazing lites in place for installation indicated.
47 D. Edge Blocks: Elastomeric material of hardness needed to limit security glazing lateral movement (side
48 walking).
49 E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to
50 control glazing sealant depth and otherwise produce optimum glazing sealant performance.

51 **2.7 FABRICATION OF SECURITY GLAZING**

- 52 A. Fabricate security glazing in sizes required to fit openings indicated for Project, with edge and face
53 clearances, edge and surface conditions, and bite complying with written instructions of product
54 manufacturer and referenced glazing publications, to comply with system performance requirements.

1 **PART 3 - EXECUTION**

2 **3.1 GLAZING, GENERAL**

- 3 A. Comply with combined written instructions of manufacturers of security glazing, sealants, gaskets, and other
4 glazing materials unless more stringent requirements are indicated, including those in referenced glazing
5 publications.
6 B. Protect edges of security glazing from damage during handling and installation. Remove damaged security
7 glazing from Project site and legally dispose of off Project site. Damaged security glazing includes units with
8 edge or face damage or other imperfections that, when installed, could weaken security glazing and impair
9 performance and appearance.
10 C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction
11 testing.
12 D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless
13 otherwise required by glazing unit manufacturer. Set blocks in thin course of compatible sealant suitable for
14 heel bead.
15 E. Do not exceed edge pressures stipulated by security glazing manufacturers for installing lites.
16 F. Provide spacers for security glazing lites where the length plus width is larger than 50 inches.
17 G. Provide edge blocking where indicated or needed to prevent security glazing from moving sideways in
18 glazing channel, as recommended in writing by security glazing manufacturer and according to requirements
19 in referenced glazing publications.

20 **3.2 TAPE GLAZING**

- 21 A. Position tapes on fixed stops so that, when compressed by security glazing, their exposed edges are flush
22 with or protrude slightly above sightline of stops.
23 B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them
24 fit opening.
25 C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal
26 framing joints by applying tapes to jambs and then to heads and sills.
27 D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in
28 tapes with compatible sealant approved by tape manufacturer.
29 E. Do not remove release paper from tape until just before each glazing unit is installed.
30 F. Apply heel bead of elastomeric sealant.
31 G. Center security glazing in openings on setting blocks and press firmly against tape by inserting dense
32 compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket
33 applications at corners and work toward centers of openings.

34 **3.3 SEALANT GLAZING (WET)**

- 35 A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between security glazing
36 and glazing stops to maintain face clearances and to prevent sealant from extruding into glazing channel
37 and blocking weep systems. Secure spacers or spacers and backings in place and in position to control
38 depth of installed sealant relative to edge clearance for optimum sealant performance.
39 B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant
40 to security glazing and channel surfaces.
41 C. Tool exposed surfaces of sealants to provide a substantial washaway from security glazing.

42 **3.4 CLEANING AND PROTECTION**

- 43 A. Immediately after installation remove nonpermanent labels and clean surfaces.
44 B. Protect security glazing from contact with contaminating substances resulting from construction operations,
45 including weld splatter.
46 1. If, despite such protection, contaminating substances do come into contact with security glazing,
47 remove substances immediately as recommended in writing by security glazing manufacturer.
48 Remove and replace security glazing that cannot be cleaned without damage.
49

50 **END OF SECTION**

LEON VAN HOOK DESTEFANO AND ARCHITECTS LLC
JULY 2017

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ISSUED FOR ADDENDUM #2
JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE
CONTRACT # 7952 MUNIS # 11471

SECTION 09 91 13

EXTERIOR PAINTING

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
- 1.2 SUMMARY
- 1.3 DEFINITIONS
- 1.4 ACTION SUBMITTALS
- 1.5 DELIVERY, STORAGE, AND HANDLING
- 1.6 FIELD CONDITIONS

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
- 2.2 PAINT, GENERAL
- 2.3 SOURCE QUALITY CONTROL

PART 3 - EXECUTION

- 3.1 EXAMINATION
- 3.2 PREPARATION
- 3.3 APPLICATION
- 3.4 FIELD QUALITY CONTROL
- 3.5 CLEANING AND PROTECTION
- 3.6 PAINT SYSTEMS (LEED-V4 NC/CI/CS COMPLIANT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on exterior environment within the garage vehicular parking space.
- B. Related Requirements:
 - 1. Section 05 50 00 "Metal Fabrications" for shop priming metal fabrications.
 - 2. Section 05 53 13 "Bar Gratings" for shop priming metal gratings.

1.3 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- F. 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 Verification: For each type of paint system and each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.

1.5 DELIVERY, STORAGE, AND HANDLING

- 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.

1.6 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PAINT PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Benjamin Moore & Co.
 2. Davis Paint Company.
 3. Diamond Vogel Paints.
 4. Glidden Professional.
 5. Sherwin Williams

2.2 PAINT, GENERAL

- A. 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.
- B. Colors: As indicated in a color schedule.
- C. Low-Emitting Materials: Architectural paints and coatings applied to walls and ceilings shall not exceed the VOC content limits established in Green Seal Standard GS-11, Paints, 1st Edition, May 20, 1993.

2.3 STAINS

- A. Concrete stains for parking garage structure:
 1. 100% Acrylic emulsion wall stain:
 - a. Product: Loxon Vertical Concrete Stain as manufactured by Sherwin Williams.
 - b. Product: PERMA-CRETE® Vertical Concrete Stain VCS as manufactured by PPG Paints.
 - 1) Sheen: Flat 0 to 5 (85° Gloss Meter)
 - 2) Cleanup: Soap and Water
 - 3) Volume Solids*: 39% +/- 2%
 - 4) Weight Solids*: 53% +/- 2%
 - 5) Viscosity*: 93 to 103 KU
 - 6) VOC*: 85 g/L (0.71 lbs./gal.)
 - 7) DRY FILM/COAT: 1.5 mils to 3.2 mils
 - 8) DRYING TIME: Dry time @ 70°F (21°C); 50% relative humidity
 - a) To Recoat: 15 minutes
 - b) To Full Cure: 30 days

2.4 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 1. ~~Owner-Contractor~~ will engage the services of a qualified testing agency to sample paint materials. ~~Contractor-Architect~~ will be notified in advance and may be present when samples are taken. If paint 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.

- 1 3. Owner may direct Contractor to stop applying paints if test results show materials being used do
2 not comply with product requirements. Contractor shall remove noncomplying paint materials from
3 Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be
4 required to remove rejected materials from previously painted surfaces if, on repainting with
5 complying materials, the two paints are incompatible.

6 **PART 3 - EXECUTION**

7 **3.1 EXAMINATION**

- 8 A. Examine substrates and conditions, with Applicator present, for compliance with requirements for
9 maximum moisture content and other conditions affecting performance of the Work.
10 B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
11 1. Concrete: 12 percent.
12 2. Masonry (Clay and CMUs): 12 percent.
13 C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and
14 primers.
15 D. Proceed with coating application only after unsatisfactory conditions have been corrected.
16 1. Application of coating indicates acceptance of surfaces and conditions.

17 **3.2 PREPARATION**

- 18 A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting
19 Specification Manual" applicable to substrates and paint systems indicated.
20 B. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and
21 incompatible paints and encapsulants.
22 C. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint
23 surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's
24 written instructions.
25 D. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or
26 alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

27 **3.3 APPLICATION**

- 28 A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural
29 Painting Specification Manual."
30 1. Use applicators and techniques suited for paint and substrate indicated.
31 B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of
32 each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of
33 undercoats to distinguish each separate coat.
34 C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a
35 uniform paint finish, color, and appearance.
36 D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller
37 tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

38 **3.4 FIELD QUALITY CONTROL**

- 39 A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency
40 to inspect and test paint for dry film thickness.
41 1. Contractor shall touch up and restore painted surfaces damaged by testing.
42 2. If test results show that dry film thickness of applied paint does not comply with paint
43 manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats
44 as needed to provide dry film thickness that complies with paint manufacturer's written
45 recommendations.
46

- 1 3.5 CLEANING AND PROTECTION
2 A. At end of each workday, remove rubbish, drop cans, rags, and other discarded materials from Project
3 site.
4 B. After completing paint application, clean spattered surfaces. Remove spilled paints by washing,
5 scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
6 C. Protect work of other trades against damage from paint application. Correct damage to work of other
7 trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an
8 undamaged condition.
9 D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted
10 surfaces.
- 11 3.6 STAIN SYSTEMS
12 A. Concrete: Cast-In-Place Concrete including but not limited to ceilings, columns, surfaces contiguous to
13 traffic coating and miscellaneous concrete surfaces.
14 Basis of Design Product: Pittsburgh Paints Perma-Crete Vertical Concrete Stain VCS 4-5100 Series.
15 1. Primer: None required.
16 2. Stain: Pittsburgh Paints Perma-Crete Vertical Concrete Stain VCS 4-5100 Series.
17 3. Coats: Provide 2 coat application at DFT recommended by manufacturer.
- 18 3.7 PAINT SYSTEMS
19 A. Concrete: Cast-In-Place Concrete including but not limited to ceilings, columns, surfaces contiguous to
20 traffic coating and miscellaneous concrete surfaces.
21 1. Basis of Design: Sherwin Williams.
22 2. Dryfall Waterborne Topcoats:
23 a. Flat Finish:
24 1) 1st Coat: S-W Pro Industrial Waterborne Acrylic Dryfall, B42-80 Series.
25 2) 2nd Coat: S-W Pro Industrial Waterborne Acrylic Dryfall, B42-80 Series (6 mils wet,
26 1.7 mils dry per coat).
27 B. CMU Substrates:
28 1. Water-Based Light Industrial Coating System:
29 a. Prime Coat: Block filler, latex, interior/exterior.
30 b. Intermediate Coat: Light industrial coating, exterior, water based, and matching topcoat.
31 Refer to Finish Schedule for gloss level required.
32 c. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3).
33 d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5).
34 e. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6).

35

END OF SECTION 09 91 13

SECTION 099120
PARKING PAVEMENT MARKINGS

- 1
- 2
- 3 PART 1 - GENERAL
- 4 1.1 RELATED DOCUMENTS
- 5 1.2 SUMMARY
- 6 1.3 SUBMITTALS
- 7 1.4 PROJECT CONDITIONS
- 8 1.5 QUALITY ASSURANCE
- 9 PART 2 - PRODUCTS
- 10 2.1 MATERIALS
- 11 2.2 PAVEMENT MARKING PAINTS
- 12 2.3 COLOR OF PAINT
- 13 2.4 BEADS
- 14 PART 3 - EXECUTION
- 15 3.1 EXAMINATION
- 16 3.2 PREPARATION
- 17 3.3 APPLICATION

18 PART 1 - GENERAL

- 19 1.1 RELATED DOCUMENTS
- 20 A. Contract Drawings and general provisions of the Contract.
- 21
- 22 1.2 SUMMARY
- 23 A. This Section includes surface preparation and application of paint systems for the high build, two coat
- 24 systems for the items of types, patterns, sizes, and colors described in this article.
- 25 B. Provide the following systems as shown on Drawings:
- 26 1. Parking Stall Stripes.
- 27 2. Traffic Arrows, crosswalks, accessible stall access aisles, walkways, symbols, stop bars, words
- 28 and other markings.
- 29 3. International Symbol of Accessibility.
- 30 C. Provide painting of curbs and curb ramps as described in the following paragraphs:
- 31 1. Paint vertical surface and the first 6 in. of the abutting horizontal surface at the top of all curbs and
- 32 islands (including PARCS equipment islands) within parking facility except those which do not
- 33 exceed 3'0" in width and abut a wall, spandrel panel, bumper wall guardrail or other construction
- 34 (not including landscaping or equipment) which prevents passage of pedestrians.
- 35 2. In parking areas, paint curb ramps (including flares), curb returns at curb ramps and any projecting
- 36 elements at edges of accessible ramps without handrails.
- 37 3. Paint color for curbs and curb ramps shall be yellow.
- 38 D. Proportion International Symbol of Accessibility in accordance with ICC A117.1-2009 Accessible and
- 39 Usable Buildings or 2010 ADA Standards for Accessible Design.
- 40 E. Related Work:
- 41 1. Pavement Marking Contractor shall verify compatibility with sealers, joint sealants, caulking and all
- 42 other surface treatments as specified in Division 07.
- 43
- 44 1.3 SUBMITTALS
- 45 A. Product Data: For each type of product indicated.
- 46 B. Provide product data as follows:
- 47 1. Manufacturer's certification that the material complies with standards referenced within this Section.
- 48 2. Intended paint use.
- 49 3. Pigment type and content.
- 50 4. Vehicle type and content.
- 51 C. Submit list of similar projects (minimum of 5) where pavement-marking paint has been in use for a period
- 52 of not less than 2 yrs.
- 53 D. Submittals and resubmittals: Engineer will review each of Contractor's shop drawings and/or submittal
- 54 data the initial time and, should resubmittal be required, one additional time to verify the reasons for
- 55 resubmittal have been addressed by Contractor and corrections made. Resubmittal
- 56 changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be

responsible for non-circled changes/revision corrections and additions. Should additional resubmittals be required, Contractor shall reimburse Owner for all costs incurred, including the cost of Engineer's service made necessary to review such additional resubmittals. Owner will not reimburse Engineer.

E. Request for Information:

1. Engineer reserves the right to reject any Request for Information (RFI) that the Engineer, at its sole discretion, deem frivolous.
2. Engineer reserves the right to reject any RFI that the Engineer, at its sole discretion, deems already answered in the Contract Documents.
3. RFI process shall not be used for requesting substitutions. Procedures for substitutions are clearly specified elsewhere in the contract documents.

1.4 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 degrees F.
- B. Do not apply paint in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.

1.5 QUALITY ASSURANCE

- A. Provide written 1-year warranty to Owner that pavement markings will be free of defects due to workmanship, inadequate surface preparation, and materials including, but not limited to, fading and/or loss of markings due to abrasion, peeling, bubbling and/or delamination. Excessive delamination, peeling, bubbling or abrasion loss shall be defined as more than 15% loss of marking material within one year of substantial completion and/or occupancy of the parking area. With no additional cost to Owner, repair and/or recoat all pavement marking where defects develop or appear during warranty period and all damage to other Work due to such defects.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Pavement marking materials shall meet Federal, State and Local environmental standards.
- B. Paint shall be manufactured and formulated from first grade raw materials and shall be free from defects or imperfections that might adversely affect product serviceability.
- C. Paints shall comply with the National Organic Compound Emission Standards for Architectural Coatings, Environmental Protection Agency, 40 CFR Part 59.
- D. The product shall not contain mercury, lead, hexavalent chromium, or halogenated solvents.

2.2 PAVEMENT MARKING PAINTS:

- A. Solvent based paint may be employed for yellow pavement markings and shall meet the requirements of MPI #32
- B. 100% acrylic waterborne paint for special color pavement markings (blue, green, red, black) shall meet requirements of Federal Specification TT-P-1952E. Special color marking materials shall be compatible with the white and yellow pavement markings where they are layered.

2.3 COLOR OF PAINT

- A. Color of paint, unless noted otherwise on Contract Drawings, shall be yellow and shall match federal color chip No. 33538. Color shall have daylight directional reflectance (without glass beads) of not less than 50% (relative to magnesium oxide) when tested in accordance with Federal Test Method Standard 141, Method 6121.
- B. Paint color for blue accessible parking space pavement markings, if shown on Contract Drawings, shall match federal color chip No. 35180. Color shall have daylight directional reflectance (without glass beads) of not less than 52% (relative to magnesium oxide) when tested in accordance with Federal Test Method Standard 141, Method 6121.
- C. Paint color for green special-use parking space pavement markings, if shown on Contract Drawings, shall match federal color chip No. 34108. Color shall have daylight directional reflectance (without glass beads) of not less than 52% (relative to magnesium oxide) when tested in accordance with Federal Test Method Standard 141, Method 6121.
- D. Paint color for red special-use parking space pavement markings, if shown on Contract Drawings, shall match federal color chip No. 31136. Color shall have daylight directional reflectance (without glass beads)

- 1 of not less than 52% (relative to magnesium oxide) when tested in accordance with Federal Test Method
2 Standard 141, Method 6121.
3 E. Paint color for black special-use pavement markings, if shown on Contract Drawings, shall match federal
4 color chip No. 37038. Black paint shall also meet Federal Specification TT-P-110.
5

6 **2.4 BEADS**

- 7 A. Use Glass Beads (Spheres) in all pavement markings except stall striping lines. Conform to Federal
8 Specification TT-B-1325D, Type I. Broadcast beads into markings at rate not less than 6 lbs. per gallon of
9 paint.

10 **PART 3 - EXECUTION**

11 **3.1 EXAMINATION**

- 12 A. Examine substrates and conditions, with Applicator present, for compliance with requirements for
13 maximum moisture content and other conditions affecting performance of work.
14 B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and
15 primers.
16 C. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
17 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.
18 D. Striping shall not be placed until full cure of concrete slab and sealer. Concrete surfaces generally require
19 30 to 90 days @ 70°F or higher. Sealers (other than silane) generally require 14 days @ 70°F or higher.
20 Silane sealers require 24 hrs @ 70°F or higher. Bituminous surfaces generally require 30 days @ 45° F or
21 higher.
22

23 **3.2 PREPARATION**

- 24 A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting
25 Specification Manual" applicable to substrates and paint systems indicated.
26 B. Do not paint or finish any surface that is wet or damp.
27 C. Clean substrates of substances that could impair bond of paints, including dirt, dust, oil, grease, and
28 incompatible paints and encapsulants.
29 D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint
30 surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's
31 written instructions.
32 E. Lay out all striping on each tier, using dimensions and details shown on Contract Drawings, before painting
33 that tier. Report any discrepancies, interferences or changes in striping due to field conditions to
34 Engineer/Architect prior to painting. Pavement Marking Contractor shall be required to remove paint, repair
35 surface treatment and repaint stripes not applied in strict accordance with Contract Drawings.
36 F. Work Areas:
37 1. Store, mix and prepare paints only in areas designated by Contractor for that purpose.
38 2. Provide clean cans and buckets required for mixing paints and for receiving rags and other waste
39 materials associated with painting. Clean buckets regularly. At close of each day's Work, remove
40 used rags and other waste materials associated with painting.
41 3. Take precautions to prevent fire in or around painting materials. Provide and maintain appropriate
42 hand fire extinguisher near paint storage and mixing area.
43 G. Mixing:
44 1. Do not intermix materials of different character or different manufacturer.
45 2. Do not thin material except as recommended by manufacturer.
46 H. Disposal:
47 1. Contractor shall properly dispose of unused materials and containers in compliance with Federal
48 Resource Conservation Recovery Act (RCRA) of 1976 as amended, and all other applicable laws
49 and regulations.
50

51 **3.3 APPLICATION**

- 52 A. Apply paint in 2-coat system; first coat shall be 50% of total 15 wet mil minimum thickness, not to exceed 8
53 mils. First coat shall be cured prior to installation of second coat. At Contractor's option, one coat may be
54 applied before substantial completion, with a second coat delayed for 3-6 months until weather conditions
55 are appropriate and the concrete has cured sufficiently for proper adhesion.
56 1. Two coat system total wet mil thickness of 0.015 in (0.381 mm).

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- 2. Two coat system total wet mil thickness of 0.018 to 0.020 in (0.457 – 0.635 mm) When Type I/A beads are used.
 - 3. Two coat system total wet mil thickness of 0.015 to 0.018 in (0.381 – 0.457 mm) When Type IVB beads are used.
- Apply painting and finishing materials in accordance with manufacturer's directions. Use applications and techniques best suited for material and surfaces to which applied. Minimum air shall be used to prevent overspray. Temperature during application shall be minimum of 40° F and rising, unless manufacturer requires higher minimum temperature. Maximum relative humidity shall be as required by manufacturer.
- C. Application of beads and/or silica sand shall coincide with application of paint, but shall be done as separate operation by a suitable dispenser. Sand may be premixed with paint for application to curbs only. Glass beads and silica sand shall adhere to the cured paint or all marking operations shall cease until corrections are made.
 - D. All lines shall be straight, true, and sharp without fuzzy edges, overspray or non-uniform application. Corners shall be at right angles, unless shown otherwise, with no overlaps. Line width shall be uniform (-0%, +5% from specified width). Beads and/or silica sand shall be applied in middle than at edges or vice versa.

END OF SECTION

SECTION 09 91 23
INTERIOR PAINTING

1
2
3 PART 1 - GENERAL
4 1.1 RELATED DOCUMENTS
5 1.2 SUMMARY
6 1.3 DEFINITIONS
7 1.4 ACTION SUBMITTALS
8 PART 2 - PRODUCTS
9 2.1 MANUFACTURERS
10 2.2 PAINT GENERAL
11 PART 3 - EXECUTION
12 3.1 EXAMINATION
13 3.2 PREPARATION
14 3.3 APPLICATION
15 3.4 INTERIOR PAINTING SCHEDULE

16 PART 1 - GENERAL

17 1.1 RELATED DOCUMENTS

- 18 A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and
19 Division 01 Specification Sections, apply to this Section.

20 1.2 SUMMARY

- 21 A. Section includes surface preparation and the application of paint systems in conditioned spaces only on the
22 following interior substrates:

- 23 1. Concrete.
24 2. Concrete masonry units (CMUs).
25 3. Steel and iron.
26 4. Galvanized metal.
27 5. Gypsum board.

28 1.3 DEFINITIONS

- 29 A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to
30 ASTM D 523.
31 B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to
32 ASTM D 523.
33 C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
34 D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to
35 ASTM D 523.
36 E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
37 F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
38 G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

39 1.4 ACTION SUBMITTALS

- 40 A. Product Data: For each type of product. Include preparation requirements and application instructions.
41 1. Include Printout of current "MPI Approved Products List" for each product category specified, with
42 the proposed product highlighted.
43 B. Sustainable Design Submittals:
44 1. Product Data: For paints and coatings, indicating VOC content.
45 C. Samples: For each type of paint system and in each color and gloss of topcoat.
46

1 **PART 2 - PRODUCTS**

2 **2.1 MANUFACTURERS**

- 3 A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may
4 be incorporated into the Work:
- 5 1. Benjamin Moore & Co.
 - 6 2. Diamond Vogel
 - 7 3. Hallman Lindsay Paints, Inc.
 - 8 4. PPG, including their Dulux/ICI Paints, AkzoNobel.
 - 9 5. Sherwin-Williams Company (The), including their Valspar range.

10 **2.2 PAINT, GENERAL**

- 11 A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in the "MPI Approved
12 Products Lists."
- 13 B. Material Compatibility:
- 14 1. Materials for use shall be tested and approved in writing by the manufacturer for use with one another and substrates
15 indicated, under conditions of use and application as demonstrated by manufacturer, based on
16 testing and field experience.
 - 17 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers
18 for use in paint system and on substrate indicated.
- 19 C. Low-Emitting Materials: Architectural paints and coatings applied to walls and ceilings shall not exceed the
20 VOC content limits established in Green Seal Standard GS-11, Paints, 1st Edition, May 20, 1993.

21 **PART 3 - EXECUTION**

22 **3.1 EXAMINATION**

- 23 A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum
24 moisture content and other conditions affecting performance of the Work.
- 25 B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
- 26 1. Concrete: 12 percent.
 - 27 2. Masonry (Clay and CMUs): 12 percent.
 - 28 3. Gypsum Board: 12 percent.
- 29 C. Proceed with coating application only after unsatisfactory conditions have been corrected.
- 30 1. Application of coating indicates acceptance of surfaces and conditions.

31 **3.2 PREPARATION**

- 32 A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting
33 Specification Manual" applicable to substrates and paint systems indicated.
- 34 B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be
35 painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied
36 protection before surface preparation and painting.
- 37 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that
38 were removed. Remove surface-applied protection if any.

39 **3.3 APPLICATION**

- 40 A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural
41 Painting Specification Manual."
- 42 B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller
43 tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- 44

- 1 3.4 INTERIOR PAINTING SCHEDULE
2 A. Refer to Materials Finish Legend for PT-# colors.
3 B. Concrete Substrates, Nontraffic Surfaces:
4 1. Institutional Low-Odor/VOC Latex System MPI INT 3.1M:
5 a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
6 b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
7 c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 2), MPI #143.
8 C. CMU Substrates:
9 1. Institutional Low-Odor/VOC Latex System MPI INT 3.1M:
10 a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
11 b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
12 c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 2), MPI #143.
13 D. Steel Substrates:
14 1. Institutional Low-Odor/VOC Latex System MPI INT 5.1S:
15 a. Prime Coat: Primer, rust inhibitive, water based MPI #107.
16 b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
17 c. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 2), MPI #144.
18 E. Gypsum Board and Plaster Substrates:
19 1. Institutional Low-Odor/VOC Latex System MPI INT 9.2M:
20 a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
21 b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
22 c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 2), MPI #143.
23 F. Insulation-Covering Substrates: Including pipe and duct coverings.
24 1. Institutional Low-Odor/VOC Dryfall Latex System MPI INT 10.1D:
25 a. Prime Coat: Primer sealer, latex, interior, MPI #50.
26 b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
27 c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 2), MPI #143.

28

END OF SECTION

LOTHAN VAN HOOK DESTEFANO AND ARCHITECTS LLC
28 JULY 2017

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ISSUED FOR ADDENDUM #2
JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE
CONTRACT # 7952 MUNIS # 11471

SECTION 10 14 00
PARKING SIGNAGE

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PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
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- 1.3 SUBMITTALS
- 1.4 QUALITY ASSURANCE
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- 3.3 INSTALLATION
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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, apply to this Section.

1.2 SUMMARY

- A. This Section includes following types of signs:
 - 1. Reflective vehicular directional and information signs (V- Signs).
 - 2. Retroreflective regulatory signs (R- Signs).
 - 3. Non-reflective pedestrian directional and informational signs (PP- Signs).
 - 4. Pedestrian Supergraphic Signs (PS- Signs).
 - 5. PVC Pipe Clearance Signs (PVC- Signs).
 - 6. Vandal-resistant Signs (VR- Signs).
 - 7. Traffic Controller Signs (TC- Signs).
 - 8. Dynamic Message Signs (DM- Signs).
 - 9. Internally-Illuminated Signs (I- Signs).
- B. Related Sections include following:
 - 1. Division 14 Section "Elevators" for elevator door jamb markings and "In Case of Fire..." signage.
 - 2. Division 26 Section "Interior Lighting" for illuminated exit signs.
 - 3. See Division 26 Sections for electrical service and connections for electrified and/or illuminated signs and/or letters.

1.3 SUBMITTALS

- A. General: Submit following in accordance with Conditions of Contract and Division 01 Specification Sections.
- B. Product Data: Include manufacturer's construction details relative to materials, dimensions of individual components, profiles, and finishes for each type of sign required.
- C. Shop Drawings: Provide shop drawings for fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show mounting methods, mounting heights, anchors, grounds, reinforcement, accessories, layout, spacing, dimensions and installation details.
 - 1. Provide message list, typestyles, graphic elements, including tactile characters and Braille and artwork as shown on drawings, and layout of lettering. Include large scale details of sign layout.
 - 2. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.
 - 3. Wiring Diagrams from manufacturer of electrified signs for power, signal and control wiring.
- D. Samples: Provide following samples of each sign component for verification of compliance with requirements indicated.

1. Samples of each sign material type (V-, R-, PP-, VR-, etc), on not less than 6-in. squares of extrusion, sheet or plate, showing full range of colors to be provided.
- E. Maintenance Plan: For signage cleaning and maintenance requirements to be included in maintenance manual.
- F. Submittals and resubmittals: Engineer will review each of Contractor's shop drawings and/or submittal data the initial time and, should resubmittal be required, one additional time to verify the process; for resubmittal have been addressed by Contractor and corrections made. All initial changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be required, Contractor shall reimburse Owner for all costs incurred, including the cost of Engineer's service made necessary to review such additional resubmittals. Owner will in turn reimburse Engineer.
- G. Request for Information:
 1. Engineer reserves the right to reject any Request for Information (RFI) that the Engineer, at its sole discretion, deem frivolous.
 2. Engineer reserves the right to reject, any RFI that the Engineer, at its sole discretion, deem already answered in the Contract Documents.
 3. RFI process shall not be used for requesting such matters. Procedures for such matters are clearly specified elsewhere in the contract documents.

1.4 QUALITY ASSURANCE

- A. Qualifications: Manufacturers: Only pre-approved manufacturers as listed herein allowed. Sign manufacturer shall have completed a minimum of 3 projects in last 3 years with similar materials and methods of manufacture as required for this project.
- B. Where warranties are required, manufacturer and/or installers shall be authorized by the entity providing the warranty.
- C. All completed signs shall be free from defects in materials and workmanship and effectively present specified or permitted message under both day and night viewing conditions. Sign faces shall be reasonably smooth, shall exhibit uniform color and brightness over entire background surface and shall not appear mottled, streaked, or stained when viewed either in ordinary daylight or incidental beams of automobile headlamps.
- D. Support structures for signs that are free-standing or extending from any exterior surface of the building, including but not limited to the roof level parking signs on cantilever supports, shall be designed by a licensed professional engineer in the State of Wisconsin in accordance with ASCE 7-98's requirements for wind loads.
- E. Internally illuminated or electrified sign cases (, TC-, CM-, DM-, and I-): Housing shall be waterproof and shall comply with NEMA Standards Publication 250-Enclosures for Electrical Equipment, for Type 4 enclosures.
- F. Electrical Components, Devices and Accessories: All components shall be listed and labeled by UL and shall comply with NEMA and NFPA standards.
- G. Electrical Service: Sign contractor shall review electrical drawings and coordinate with electrical contractor for any minor changes to design and installation of equipment and/or electrical service for powering signs and/or illumination thereof. If change order(s) are possible, use the Request for Information process.
- H. Regulatory Requirements:
 1. Comply with Americans with Disabilities Act (ADA) and state and local codes as adopted by authorities having jurisdiction.
 2. MUTCD:
 - a. Regulatory R- signs shall be fully compliant with all requirements of the Manual on Uniform Traffic Control Devices (MUTCD) except that sign size may be modified due to space constraints.
- I. Single-Source Responsibility: For each separate required type of sign as defined herein, obtain signs from a single firm specializing in this type of work so that there will be undivided responsibility for such work.
- J. Design Criteria: Drawings indicate sizes, profiles, and dimensional requirements of signs. Other signs with deviations from indicated dimensions and profiles may be considered, provided deviations do not change design concept. Burden of proof of equality is on proposer.
- K. Coordinate sign placement with structural configuration and lighting location. Before sign installation, arrange meeting with Engineer/Architect and lighting installer at site to review sign placement. Additional compensation not allowed for relocating signs after installation if relocation required due to conflicts with lighting or structure.
- L. Trade Names: Do not display manufacturer's name, trade name, trademarks, or similar markings on exterior or visible surfaces.
- M. Sign Quantity Count: Sign Fabricator shall be responsible for determining the final quantity count of all signs, as indicated on the Signage Schedule and Location Plans, prior to fabrication.

- 1 N. Provide written 5 year full replacement warranty to Owner that all signage will be free of defects due to
2 workmanship and materials including, but not limited to, fading, peeling, delamination, and installation.
3 With no additional cost to Owner, repair all defects that develop during warranty period and all damage to
4 other Work due to such defects. NOTE: Additional warranties apply to specific sign types and products, as
5 specified herein.
6 O. Finishes Warranty: Submit five-year written warranty, signed by the Contractor and Installer, warranting
7 that the architectural signage finishes will not develop excessive fading or excessive non-uniformity of
8 color or shade and will not crack, peel, pit or corrode or otherwise fail as a result in defects, within the
9 warranty period, make necessary repairs or replacement at the convenience of the owner or facility's
10 management.
11 1. "Excessive Fading": A change in appearance which is perceptible and objectionable as determined
12 by the Designer when visually compared with the original color range standards.
13 2. "Excessive Non-Uniformity": Non-Uniform fading during the period of the guarantee, to the extent
14 that adjacent panels have a color difference greater than the original acceptance range of color.
15 3. "Will Not Pit or Otherwise Corrode": No Pitting or other type of corrosion discernible from a
16 distance of 10'-0", resulting from the natural elements in the atmosphere at the project site.
17 P. Replacement or Repairs: The owner or facilities management shall have the right to continue use of the
18 defective part until such time that the part is replaced or repaired without loss or inconvenience to the
19 owner or facility's management. Warranties shall also state that the replaced or repaired part shall have a
20 warranty period equal to the remaining warranty period for the replaced or repaired part plus an additional
21 one year.
22

23 **1.5 PROJECT CONDITIONS**

- 24 A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to
25 ensure proper fitting and mounting. Where sizes of signs may be affected by dimensions of surfaces on
26 which they are installed, verify dimensions by field measurement. Show recorded measurements on final
27 shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.
28

29 **1.6 COORDINATION**

- 30 A. For signs to be supported by or anchored to permanent construction, provide installers with specific
31 requirements for anchorage devices. Furnish templates for installation.
32 B. Coordinate location of remote transformers with building construction. Ensure that transformers are
33 accessible after completion of Work.
34

35 **1.7 MAINTENANCE**

- 36 A. Maintenance Instruction: Furnish maintenance manual to instruct the owner or facility's management
37 personnel in procedures to be followed in cleaning and maintaining the signage. Provide manufacturer's
38 brochures describing the actual materials used in the Work, including metal alloys and finishes.
39 1. Include a list of cleaning materials appropriate for continued cleaning of signs. Include written
40 instructions for proper maintenance, service access, replacement procedures, etc. Include
41 recommended methods for removal of residual adhesives from wall surfaces after removal of
42 adhesive mounted signs.
43 B. Extra Materials: Deliver to the owner or facility's management in manufacturer's original packaging and
44 store at the project site where directed.
45 1. Furnish one quart of each finish paint color for touch-up purposes.

46 **PART 2 - PRODUCTS**

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48 **2.1 MANUFACTURERS**

- 49 A. Basis of Design Product: Where named products are specified, subject to compliance with requirements
50 specific to this project, provide either named product or an equivalent product by other manufacturers
51 specified.
52 B. Manufacturers: Subject to compliance with requirements specific to this project, accepted manufacturers
53 listed in Part 2 are considered to have been prequalified in conformance with paragraph 1.4.A and B of this
54 section. Acceptable manufacturers include, but are not limited to the following:
55 1. Manufacturers of panel signs, including V-, R-, PP-, PS- and VR- signs:
56 a. ABC Architectural Signing System, Division of Nelson-Harkins Industries.
57 b. Alcan Composites, Benton, KY.
58 c. Allenite, A Division of Allen Marking Products, Inc.
59 d. Andco Industries Corp.

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- e. APCO Graphics, Inc.
- f. Architectural Graphics, Inc.
- g. ASI Sign Systems, Inc.
- h. Best Manufacturing Co.
- i. Interstate Highway Sign Corp.
- j. Henry Graphics.
- k. Britten Studios.
- l. Pannier Graphics.
- m. Tapco.
- n. Vomar.
- o. Signs & Decal Corp., Brooklyn, NY
- p. Takeform, Medina, NY
- 2. Manufacturers of TC-, and DM- signs:
 - a. National Sign & Signal Company.
 - b. C.J. Hood Co.
 - c. Colite Industries, Inc.
 - d. Daktronics.
 - e. Signal Tech (formerly Howard Industries).
 - f. 3M Dynamic Message Signs (formerly American Electronic Sign).
- 3. Manufacturers of I- signs:
 - a. Andco Industries Corp.
 - b. ASI Sign Systems, Inc.
 - c. Interstate Highway Sign Company.
 - d. Vomar.
 - e. Signs & Decal Corp., Brooklyn, NY

2.2 MATERIALS

A.

- Graphics:
- 1. Graphics shall be highest quality with sharp lines and smooth curves. Images shall be uniform colors and free from streaks or spotting.
 - 2. Silk screening: Where specified or permitted, silk screening shall be highest quality, with sharp lines, no sawtooths, or uneven ink coverage.
 - a. Screens shall be photographically reproduced.
 - b. Background ink shall be process inks as recommended by manufacturer of substrate employed.
 - c. Ink application through screens: 1 flood pass and 1 print pass. Images: uniform color and ink thickness; free from squeegee marks and lines.
 - d. Signs: dry in adequate racks with 2 in. spacing for ample air flow and forced air drying and curing.
 - e. Package signs only after they have dried completely per ink manufacturer's time allowances.
 - f. Where reflective messages are specified or permitted to be reverse silk-screened with a non-reflective, opaque background, the sheeting material shall be 3M Scotchlite Engineer Grade Reflective Sheeting Series 3200 or equivalent meeting US Department of Transportation Standard Specification for Construction of Roads and Bridges on Federal Highway Products, 1985 FP-85, Type II, Section 718.01.
 - g. Where reflective messages are specified or permitted to be reverse silk-screened with a reflective, transparent background, the sheeting material shall be 3M Scotchlite High Intensity Grade Sheeting Series 3930 or equivalent meeting US Department of Transportation Standard Specification for Construction of Roads and Bridges on Federal Highway Products, 1985 FP-85, Type IIIA, Section 718.01.
 - 3. Pressure applied graphics:
 - a. Where pressure-applied graphics applied to a painted background are specified or permitted, the paint shall be flat, opaque acrylic polyurethane as recommended by manufacturer of substrate and graphic media.
 - b. Where pressure-applied, reflective graphics on an opaque painted background are specified or permitted, letters shall be digitally produced, and cut by electronic cutting machines from 3M Scotchlite Electrocut Engineer Grade Sheeting Series 3260 material, colors as noted on drawings or equivalent. Edges shall be sealed per manufacturer recommendation.
 - c. Where pressure-applied, reflective graphics on a reflective background are specified or permitted, the sheeting material shall be 3930 Hi Intensity Prismatic or equivalent meeting

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US Department of Transportation Standard Specification for Construction of Roads and Bridges on Federal Highway Products, 1985 FP-85, Type IIIA, Section 718.01. The letters shall be digitally produced, and cut by electronic cutting machines from 3M Scotchlite Electronic Cuttable Film Series 1170, colors as noted on drawings or equivalent.

- d. Where pressure-applied, non-reflective graphics are specified, letters shall be digitally produced, and cut by computer-driven processes from 3M Scotchcal Electrocut 7725 film.
- e. Where electronically cut letters and symbols are specified, the inside corners shall be rounded using the largest radius consistent with acceptable appearance. Minimum radius shall be 1/8 inch on a 3 inch letter. Use prespacing tape as recommended by manufacturer of sheeting as a carrier for letters, numerals and symbols.

- 4. Where specified, dry film transfer shall be produced digitally using computer-driven Dry Thermal Transfer system over 3M high intensity reflective vinyl substrates.
- 5. All products specified to employ 3M sheeting, films, or other components shall be guaranteed and backed by 3M MCS Warranty or equivalent.

B. Inks and Paints:

- 1. All inks and paints shall be a type made for surface material to which it is applied, and recommended by manufacturer. Exact identification shall be noted on shop drawings, with data describing application method, if other than air-drying. Prohibited: paint or ink that will fade, discolor, or delaminate due to UV or heat exposure.
- 2. All colors for which color match specified shall be approved by Engineer/Architect prior to production.
- 3. Acceptable manufacturers and suppliers of inks for silk-screening shall be only those materials recommended by the manufacturer of the sheeting and as required for 3M MCS warranty, or equivalent, where applicable.
- 4. Paints: all materials best quality. Products of DuPont DeNemours & Company, Pittsburgh Plate Glass Company, Glidden, Matthews or Sherwin-Williams acceptable.
 - a. Opaque background for pressure applied graphics: Two part acrylic polyurethane, low gloss. Care shall be taken to provide proper curing so that outgassing does not occur after application of sheeting and/or graphics.
 - b. Base for painted graphics on concrete, stucco, masonry and concrete masonry units to be prepared per Paint specifications. Graphics two part acrylic polyurethane, low gloss.
- 5. Applied color whether ink or paint shall conform to color and accelerated weathering requirements of FP-79 and shall not be removable when tested by Film Adhesion Test and by Film Hardness Test.

C. Blank Panels: Comply with requirements indicated for materials, thickness, finish, color, design, shape, size, and details of construction.

- 1. General:
 - a. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 0.0625 in. measured diagonally.
 - b. The back side and edges of all panel signs shall be painted with acrylic polyurethane, color to match the specified background color.
 - c. Edge Condition: Square cut.
 - d. Corner Condition: Square cut for all signs except Regulatory and Warning signs. Regulatory and Warning sign corners shall be rounded per MUTCD.
- 2. Aluminum:
 - a. Provide aluminum sheet of 6061-T6 or 5052-H38 alloys and temper recommended by aluminum producer or finisher for use type and finish indicated, and with not less than strength and durability properties specified in ASTM B209 for 5005-H15.
 - b. Aluminum extrusions shall be of alloy and temper recommended by aluminum producer for type of use and finish and with not less than strength and durability properties specified in ASTM B221 for 6063-T5.
 - c. Panels shall be etched, degreased, flat, and free of ragged edges. Radius corners by stamping. All signs of same size shall be totally uniform in size. Surface shall be completely clear of dust and dirt before finishes applied.
 - d. Panels to receive 3M sheeting and/or paint shall be treated with an anodizing conversion coating to provide resistance to corrosion and white rust formation. Conversion coating may be:
 - 1) Chromate, meeting ASTM B449 class 2. Coating weight should be 10 to 35 mg per sq ft with a median of 25 mg per square foot. Coating shall not be dusty and shall be tightly bonded within itself and to the aluminum substrate.
 - 2) Non-chromate coatings must meet the requirements for ASTM B449 class 1 chromate coatings. The non-chrome coating shall be adherent and non-powdery.

Adhesion of air dried acrylic coating shall meet ASTM D 3359 or ASTM D 4541 and must be equivalent to that of the coating on chromate coated aluminum of the same alloy.

Fabricate aluminum signs with adequately sized, full-length stiffener members as indicated on Drawings.

Calcium Carbonate 95.0%

Other 5-10%

Melting Point >350 degrees F.

- D. V- Signs: Vehicular signs with reflective graphics and retroreflective message on an opaque background.
1. Base materials:
 - a. Aluminum with either reverse silk screened graphics or pressure-applied retroreflective letters.
 2. Graphics and Copy: Any of the following methods of producing graphics and copy may be employed:
 - a. Pressure applied retroreflective white letters/symbols. Use 3M High Intensity Prismatic White Sheeting 3930.
 - b. Silk screened; background inks shall be opaque, with retroreflective message.
- E. R- Regulatory and W- Warning vehicular signs with retroreflective graphics and message on a retroreflective background.
1. All regulatory and warning signs to fully comply with MUTCD standards.
 2. Base material: Aluminum.
 3. R and W signs shall have retroreflective messages and retroreflective background using either silk screening or pressure applied retroreflective letters and symbols.
 4. Retroreflective colors determined by 23 CFR Appendix to Subpart F of Part 655, Alternate Method to Determining the Color of Retro-reflective Sign Materials and pavement marking materials.
 - a. Federal Highway Authority (FHWA) Reflective Sheeting Identification Guide using ASTM D 4956-04.
 - b. Sheeting Types I through IX.
 - c. The daytime color of non-fluorescent retroreflective materials may be measured in accordance with ASTM Method E 1349, Standard Test Method for Reflectance Factor and Color by Spectrophotometry using Bi-directional Geometry of ASTM Test Method E 1347. Standard Test Method for Color and Color-Difference Measurement by Tristimulus Colorimetry.
 - d. The geometric conditions to be used in both test methods are 0/45 or 45/0 circumferential illumination or viewing. The CIE standard illuminant used in computing the colorimetric coordinates shall be D 65.
 - e. For fluorescent retroreflective materials ASTM E991 may be used to determine the chromaticity provided that the D65 illumination meets the requirements for E 991.
 - f. The following 3M Diamond Grade DG³ Reflective Sheeting materials meet the MUTCD retroreflective requirements:
 - 1) White - DG³4090
 - 2) Red - DG³4092
 - 3) Blue - DG³4095
 - 4) Yellow - DG³4091
 - 5) Green - DG³4097
 - 6) Brown - DG³4099
 - 7) Fluorescent Yellow - DG³4081
 - 8) Fluorescent Yellow Green - DG³4083
 - 9) Fluorescent Orange - DG³4084
- F. PP- Pedestrian Panel Wayfinding and Directional Signs.
1. Base materials:
 - a. Aluminum with either reverse silk screened graphics or pressure-applied letters.
 2. Graphics and Copy: Any of the following methods of producing graphics and copy may be employed:
 - a. Pressure applied non-reflective letters/symbols.
 - b. Silk screened over a flat opaque background.
- G. PS-Supergraphics, Pedestrian Wayfinding and Directional Signs:
1. Painted Super-Graphics: Where graphics painted directly on walls, doors or other surfaces are specified, message template to be:
 - a. Pressure applied electronically cut graphics.

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2. Apply primer and/or background color as specified on the drawings to surface as required. Sign contractor shall assure that paint employed for graphics is compatible with surface treatment(s) by others, including but not limited to concrete sealers and/or form release agents.
- H. PVC- Signs: PVC pipe clearance signs shall have pressure applied decals on black PVC pipe, rectangular retroreflective yellow base sticker-3M Diamond Grade yellow sheeting DG³ 4091 with black border, rounded corners, and black text. See drawings.
 1. Electronically cut letters: 3M Scotchlite 3840 reflective sheeting.
 2. 10 in. diameter, Schedule 40 PVC pipe, Corrosion Fluid Products Corporation, Addison, IL, or accepted equivalent. Color black.
 3. If black PVC is not available, Paint: "Spraylat" Lacryl B No. 482 High Hiding Black. Meet Lacryl system specifications for painting on PVC.
- I. VR- Signs: Vandal-resistant signs where specified, shall have copy and graphics on second surface.
 1. Base material shall be one of the following:
 - a. "Lexan" General Electric Co., or accepted equivalent. Permanently laminate face panels to backing sheets of material and thickness indicated using manufacturer's standard process. Except where digital art is required, signs shall be silk screened on second surface or single sheet.
 - b. "Modulite/Moducal" by Pannier Graphics or equivalent fiberglass reinforced plastic (FRP) material. Copy and graphics shall be permanently embedded in fiberglass panel. Resulting sign shall be a solid, one-piece panel with graphic elements inseparable from fiberglass in which they are embedded. Laminated or encapsulated products will not be accepted.
 2. Sign shall not be permanently defaced by steam, acids, aromatics, scratching, inks or paints and should be capable of being readily wiped clean with paint remover without affecting appearance or legibility of graphics. Sign shall retain legibility and finished appearance when sprayed with a 10% solution of hydrochloric, nitric or sulfuric acid for one-half hour or when scrubbed by a brush of medium hardness using common commercial cleaning compounds such as ammonia, laundry soaps, detergents, carbon tetrachloride or petroleum based solvents.
 3. Sign shall be translucent with a clear or matte finish, as indicated. The index of refraction shall ensure clarity of color, copy and graphics.
 4. Sign shall be router cut with sign edges not crazed or cracked and edge finish shall be smooth, neat and clean.
 5. Original art and/or multi-colored graphics shall be digitally produced, electronic media.
 6. Use colored coatings, including inks and paints for copy and background colors, recommended by manufacturer of sheet for optimum adherence to sheet surface and that are non-fading for application.
 7. Fasteners shall be mechanical, concealed and tamper proof.
- J. Illuminated Traffic Controller Signs (TC- Signs):
 1. Illuminated traffic control signs shall be Signal Tech LED controller or equivalent. Traffic arrows shall be TCL1212 series; open/closed or full messages shall be TCL718 series.
 2. Display technology shall be super bright LED using aluminum gallium indium phosphide (AlGaInP) diodes. Viewing angle shall be 70°.
 3. Provide for automatic control from PARCS system computer with individual manual override operator control switches located in parking office. In addition, provide additional manual override switches in cashier booth nearest lane controlled.
- K. Dynamic Message Signs (DM- Signs):
 1. Sign design, construction, fabrication, and assembly shall be sign contractor responsibility, subject to Engineer/Architect's review. Where free-standing, supports shall meet AASHTO Standard Specifications for Highway Signs, Luminaries and Traffic Signals (Latest edition).
 2. System to be Daktronics Vanguard VMS or equivalent. Each message line shall be variable and programmable. Display technology shall be LED using aluminum gallium indium phosphide (AlGaInP) diodes. Each digit shall be 7" high, with 7 LED bar segments in amber unless noted otherwise on drawings. The number of characters and/or lines per sign is variable by location, as shown on the drawings.
 3. Product shall include all hardware and hardware for Central Control of messages including a computer terminal dedicated thereto. System shall be National Transportation Communications for ITS Protocol (NTCIP) compliant. Control software shall use Windows® NT operating system, with the following features:
 - a. User interface configurable for specific sign size (WYSIWYG).
 - b. Multiple security password levels.
 - c. Message creation & editing capability.
 - d. Graphics display capability.
 - e. Fonts can be changed and customized to fit client needs.

- f. Message preview function.
 - g. Flexible message library.
 - h. Message scheduling.
 - i. Scenario manager.
 - j. Quick message capability.
 - k. Real-time message verification.
 - l. Automatic or manual dimming.
 - m. Sign status monitoring.
 - n. VMS system diagnostics (pixels, power supplies, etc.).
 - o. Controls multiple signs within VMS network.
 - p. Interfaces with various communication systems (telephone, cellular, fiber, radio, CDPD).
 - q. Map view user interface.
4. Functional Requirements:
- a. The number of messages per sign required is variable by location, as shown on the drawings.
 - b. All messages shall be clearly legible, attracting attention under any lighting condition. At full intensity, sign shall be visible anywhere within 500' or as indicated about optic axis.
 - c. Where two-way messages are specified, each shall be single or multi-message overlay.
 - d. Sign shall completely blank out when not energized. No phantom message shall be visible under any ambient light condition.
 - e. Technology shall be solid state, redundant circuitry so that removal or failure of one component has minimal or no effect on overall sign performance.
 - f. Signs shall be capable of continuous operation from -35° F to 165° F.

L. Internally Illuminated Signs (I Signs):

1. Sign design, construction fabrication and assembly shall be contractor responsibility, subject to Engineer's review.
2. Aluminum panels, when proposed, to be extruded, anodized aluminum with welded corners and aluminum tube framing as required for straight profiles. Case shall be finished with baked enamel or duranodic in color as shown on the drawings. Illuminated messages, where required, shall be precision cut and filled with translucent material. Illuminated graphics shall be integral and flush with sign face for flat appearance. Raised letters or those projecting beyond sign face will not be accepted.
3. Non-illuminated messages, where specified, shall employ any of the following methods:
 - a. Pressure applied non-reflective letters/symbols.
 - b. Silk screened.
4. Full message where shown shall be LED letters. Full message shall not be readable when turned off. Full message shall be controlled by PARCS system.
5. No buckling, weaving, or oil canning of face panels.
6. Sign mounting shall be as noted as drawings from among following:
 - a. Wall or ceiling mount: Provide mounting channel brackets as required by sign size and location.
 - b. Post mount: Sign to be mounted on aluminum posts at both ends, with base plate bolted to concrete foundation to below local frost depth or a minimum of 1/3 the pole height which ever is greater. Coordinate anchor bolt locations with general contractor.
 - c. Concrete pedestal mount. Sign to be mounted on concrete pedestal as detailed on drawings. Coordinate anchor bolt, post sleeves and concealed electrical connections with pedestal contractor.
 - d. Aluminum pedestal mount: Provide aluminum pedestal cover per drawings. Coordinate anchor bolt, post sleeves and concealed electrical connections with pedestal contractor.
7. All fasteners and brackets shall be non-corrosive.
8. All electrical connections shall be concealed but accessible and serviceable.
9. Interior of cabinet to be primed and painted white with acrylic polyurethane, high gloss finish.
10. Illumination shall be designed by contractor. Incandescent light sources will not be accepted. Each sign shall contain terminal board with adequate wiring. Lamps to be spaced to prevent shadows and hot spots. Uneven illumination will be rejected. Ballast shall be appropriate to temperature ranges at project site. Minimum luminance of sign message shall be 10 cd/m² at night and 30 cd/m² during the day.

M. Fasteners and Supports:

1. Bolts, nylon insert lock nuts: ASTM A 320, Grade B stainless steel.
2. Rivets for signs: ASTM B 316, Alloy 6063-T61 or equivalent. Aluminum alloy blind rivets of self-plugging variety may be substituted for solid aluminum alloy rivets, subject to acceptance by Engineer/Architect.

- 1 3. Use concealed fasteners fabricated from metals not corrosive to sign material and mounting
- 2 surface.
- 3 4. Anchors and Inserts: Use nonferrous metal or hot dipped galvanized anchors and inserts for
- 4 exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead
- 5 expansion bolt devices for drilled in place anchors. Furnish inserts, as required, to be set into
- 6 concrete or masonry work.
- 7 5. Sign posts: ASTM A 499 Grade 60 or ASTM A 576, Grade 1080 and meeting mechanical
- 8 properties specified in ASTM A 499 for Grade 60 steel.
- 9 6. Posts shall be zinc coated per ASTM A 123. Posts shall be straight, with smooth, uniform finish,
- 10 free from defects affecting strength, durability, or appearance. Punch bolt holes such that post face
- 11 shall be smooth and even. All holes and ends shall be burr free. After all fabrication, flow coat posts
- 12 with durable, exterior type, rust inhibiting paint. Paint color: black, unless otherwise indicated on
- 13 Drawings.
- 14 7. Adhesives, where used for wall mounted signs, shall be per the sign material manufacturer's
- 15 recommendations.
- 16 8. For DiBond signs, fasteners and mountings shall follow manufacturer's recommendations.
- 17 Minimum edge distance of 0.75" or 2.5 times the diameter of the fastener being used is
- 18 recommended as the distance from the center of the hole to the edge of the panel. Large flat
- 19 washers shall be used to prevent crushing of the sign material.

20 **PART 3 - EXECUTION**

21
22 **3.1 SURFACE PREPARATION OF SUBSTRATE FOR PAINTED SIGNS**

- 23 A. Prepare and clean in strict accordance with paint manufacturer's instructions and as specified here, for
- 24 each substrate condition.
- 25 B. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to
- 26 mechanical cleaning. Program cleaning and painting so contaminants from cleaning process will not fall
- 27 onto wet, newly painted surfaces.
- 28 C. Cementitious Surfaces:
- 29 1. Prepare surfaces to be painted by removing all efflorescence, chalk, dust, dirt, grease, oils, and, by
- 30 roughening as required, glaze.
- 31 2. Determine alkalinity and moisture content of surfaces to be painted by appropriate testing. If
- 32 surfaces found to be sufficiently alkaline to cause blistering and burring of finish paint, correct
- 33 before painting. Do not paint on surfaces with moisture content exceeds manufacturer's limits.
- 34 D. Ferrous Metals: Clean uncoated ferrous surfaces of oil, grease, dirt, loose mill scale, and other foreign
- 35 substances by solvent or mechanical cleaning. Clean previously coated metals in accordance with
- 36 manufacturer recommendation.

37
38 **3.2 MATERIALS PREPARATION FOR PAINTED SIGNS**

- 39 A. Mix and prepare painting materials per manufacturer's directions.
- 40 B. Store materials not in use in tightly covered containers. Keep all containers clean, free of foreign materials
- 41 and residue.
- 42 C. Stir materials before applying to produce uniform mixture, and stir as required during application. Do not
- 43 stir surface film into material. Remove film and strain material before using if necessary.

44
45 **3.3 INSTALLATION**

- 46 A. General: Locate signs where shown using mounting methods of type described and in compliance with
- 47 manufacturer's instructions. Install sign units level, plumb, and at height shown, with sign surfaces free
- 48 from appearance defects.
- 49 B. For drilled anchors in concrete, verify location of embedded reinforcing steel, post-tensioning, or pre-
- 50 stressing cables prior to installation.
- 51 C. Wall Mounted Panel Signs: Attach to wall surfaces with Hilti "Hit" anchors or ITW Ramset/Red Head
- 52 Hammer Set anchors into concrete or masonry surfaces as shown on Drawings. DO NOT OVERDRIVE
- 53 anchors, as overdriven anchors will damage sign faces and spall concrete.
- 54 D. Bracket Mounted Units: Provide manufacturer's standard brackets, fittings, and hardware as appropriate
- 55 for mounting signs which project at right angles from walls or ceilings. Attach brackets securely to walls or
- 56 ceilings with concealed fasteners and anchors per manufacturer's directions.
- 57 E. Installation of signs shall conform to requirements of Americans with Disabilities Act (ADA) and/or state or
- 58 local accessibility standards.
- 59

1
2 3.4 CLEANING AND PROTECTION

- 3 A. At completion of installation, clean soiled sign surfaces in accordance with manufacturer's instructions.
4 Protect units from damage until acceptance by Owner.
5 B. Cleanup: During progress of Work, remove from site all discarded materials and rubbish at end of each
6 day.
7 C. Upon completion of painting, clean all paint spattered surfaces. Remove spattered paint by proper
8 methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
9 D. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and
10 finishing. Correct any damage by cleaning, repairing, or replacing, and repainting, as acceptable to
11 Engineer/Architect.
12 E. Provide "Wet Paint" signs as required.
13
14

END OF SECTION

15
16

SECTION 10 28 00

TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
- 1.2 SUMMARY
- 1.3 ACTION SUBMITTALS
- 1.4 INFORMATIONAL SUBMITTALS
- 1.5 QUALITY ASSURANCE
- 1.6 COORDINATION
- 1.7 WARRANTY

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
- 2.2 MATERIALS
- 2.3 PUBLIC-USE WASHROOM ACCESSORIES
- 2.4 UNDERLAVATORY GUARDS
- 2.5 CUSTODIAL ACCESSORIES
- 2.6 MADISON FIRE DEPARTMENT KNOX BOX
- 2.7 FABRICATION

PART 3 - EXECUTION

- 3.1 INSTALLATION
- 3.2 ADJUSTING AND CLEANING

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. Public-use washroom accessories.
 - 2. Underlavatory guards.
 - 3. Custodial accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.
 - 2. Identify products using designations indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

1.6 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.7 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silvering defects and that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 15 years from date of Substantial Completion.

2.0 FINISH PRODUCTS

2.1 MANUFACTURERS

- A. 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:
 - 1. Bobrick.
 - 2. Bradley Corp.
 - 3. ASI.

2.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- C. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- D. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- F. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- G. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- H. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.3 PUBLIC-USE WASHROOM ACCESSORIES

- A. Toilet Tissue (Roll) Dispenser (TTD-1):
 - 1. Basis-of-Design Product: Bobrick B-2888.
 - 2. Description: Satin-finish stainless steel unit with stainless steel dispensing mechanism. Door has flat face with protruding tumbler lock. Holds two rolls up to 5-1/4 inches (135 mm) diameter (1800 sheets). Extra roll automatically drops in place when bottom roll is depleted. Theft-resistant, heavy-duty spindles. Unit 6-1/16 inches W, 11 inches H, 5-15/16 inches D (155 x 280 x 150mm).
- B. Combination Towel (Folded) Dispenser/Waste Receptacle (HU-2):
 - 1. Basis-of-Design Product: Bobrick B-369.
 - 2. Description: Satin-finish stainless steel. Seamless beveled flange. Dispenses 350 C-fold or 475 multifold towels. Knob-latch retains door. Removable waste container has 2-gallon (7.6-L) capacity. Rough Wall Opening: 12-5/8 inches W, 26-5/8 inches H, 4 inches minimum depth (320 x 675 x 100mm).
- C. Grab Bar (GB-1):
 - 1. Basis-of-Design Product: Bobrick B-5806.
 - 2. Description: 1-1/4 inches (32 mm) diameter tubing. Constructed of 18-gauge (1.2 mm), type 304 satin-finish stainless steel tubing. Concealed mounting flange 1/8 inch (3 mm) thick, type 304 stainless steel plate, 2 inches W x 3-1/8 inches H (50 x 80 mm), with screw holes for concealed anchors. Cover is 22-gauge (0.8 mm), type 304 stainless steel with satin finish, 3-1/4 inches (85 mm) diameter. Cover snaps over mounting flange to conceal screws.
 - 3. Configuration and Length:
 - a. GB-1A: 36 inches (914 mm) horizontal grab bar.
 - b. GB-1B: 42 inches (1067 mm) horizontal grab bar.
 - c. GB-1C: 18 inches (457 mm) vertical grab bar.
- D. Sanitary-Napkin Disposal Unit (HU-1):
 - 1. Basis-of-Design Product: Bobrick B-270.

- 1 2. Description: Satin-finish stainless steel. Cover is drawn, one-piece construction; secured to cabinet
2 with full-length stainless steel piano-hinge. Capacity: 1.0-gallon (3.8-L). Unit 7-1/2 inches W, 10
3 inches H, 3-13/16 inches D (190 x 255 x 95 mm).
- 4 E. Mirror Unit (MU-1):
5 1. Basis-of-Design Product: Bobrick B-294.
6 2. Description: Tilt forward to provide full visibility for wheelchair patients or return to upright position.
7 Frame is 3/4 inch x 3/4 inch (19 x 19 mm), type 304 stainless steel angle, satin finish. Beveled edges
8 of frame; provides gapless fit for improved appearance, and safety when cleaning mirror. No. 1
9 quality, 1/4 inch (6 mm) glass mirror; warranted against silver spoilage for 15 years. Top of mirror tilts
10 7 inches (180 mm) from wall with self-locking mechanisms; bottom of mirror mounts to wall with full-
11 length stainless steel hinge.
12 3. Size: 18 inches (457 mm) W x 30 inches (762 mm) D.
- 13 F. Coat Hook: At Locker Room
14 1. Stainless multi-hook. Refer to Drawings.
- 15 2.4 UNDERLAVATORY GUARDS
16 A. Underlavatory Guard:
17 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products
18 that may be incorporated into the Work include, but are not limited to, the following:
19 a. Truebro by IPS Corporation.
20 b. Plumberex Specialty Products, Inc.
21 c. Buckaroos, Inc.
22 2. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct
23 contact with and burns from piping; allow service access without removing coverings.
24 3. Material and Finish: Antimicrobial, molded plastic, white.
- 25 2.5 CUSTODIAL ACCESSORIES
26 A. Utility Shelf (US-1):
27 1. Basis-of-Design Product: Bobrick 224 x 24.
28 2. Description: Shelf is 18-gauge (1.2mm), type 304 stainless steel, satin finish; 24 inches Long, 6
29 inches H, 8 inches D (610 x 150 x 205 mm). Four anti-slip mop holders have spring-loaded rubber
30 cam that grips handles 7/8 inch to 1-1/4 inches (20-30 mm) diameter. Holds mops 8 inches (205 mm)
31 from wall. Three stainless steel rag hooks. Rod for wet rags below shelf.
- 32 B. Mop and Broom Holder (MB-1):
33 1. Basis-of-Design Product: MB-1).
34 2. Description: 24 inches (610 mm) long. Type 304 stainless steel, satin finish. Anti-slip mop holders
35 have spring-loaded rubber cam that grips handles 7/8 inch to 1-1/4 inches (20-30 mm) diameter.
36 Holds 3 mops 3-1/4 inches (85 mm) from wall. Height 5 inches (125 mm).
- 37 2.6 MADISON FIRE DEPARTMENT KNOX BOX
38 A. Key Vaults: A key box shall be installed and incorporated into the entry access bollard as located on plan
39 and as detailed. Fabrication and installation shall comply with Madison City Ordinance 918.
40 B. Provide and place Fire Department alert decals (e.g. Knox Company stock #1001) on each exterior door or
41 door frame of the building near the lock cylinder. Regarding label placement for a group of doors, one label
42 for each pair of doors or a group of contiguous doors shall be required.
- 43 2.7 FABRICATION
44 A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access
45 panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant
46 backing plates.

47 **PART 3 - EXECUTION**

48 **3.1 INSTALLATION**

- 49 A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate
50 indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations
51 and at heights indicated.
52 B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

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- 1 3.2 ADJUSTING AND CLEANING
- 2 A. Adjust accessories to unencumbered, smooth operation. Replace damaged or defective items.
- 3 B. Remove temporary labels and protective coatings.
- 4 C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10 28 00

SECTION 32 31 13

CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
- 1.2 SUMMARY
- 1.3 ACTION SUBMITTALS
- 1.4 PROJECT CONDITIONS

PART 2 - PRODUCTS

- 2.1 CHAIN-LINK FENCE FABRIC
- 2.2 FENCE FRAMING
- 2.3 TENSION WIRE
- 2.4 SWING GATES
- 2.5 FITTINGS

PART 3 - EXECUTION

- 3.1 EXAMINATION
- 3.2 CHAIN-LINK FENCE INSTALLATION
- 3.3 GATE INSTALLATION
- 3.4 ADJUSTING

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. Chain-link fences and gates: swing inside parking structure at lowest level. Refer to Drawings.
- B. Related Sections:
 - 1. Section 03 30 00 "Cast-in-Place Concrete" for cast-in-place concrete.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. [Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates.]
 - 1. Fence and gate posts, rails, and fittings.
 - 2. Chain-link fabric, reinforcements, and attachments.
 - 3. Accessories: Insert accessory.
 - 4. Gates and hardware.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show accessories, hardware, gate operation, and operational clearances.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

PART 2 - PRODUCTS

2.1 CHAIN-LINK FENCE FABRIC

- A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist. Comply with CLFMI Product Manual and with requirements indicated below:
 - 1. Fabric-Height: As indicated on Drawings.
 - 2. Steel Wire Fabric: Wire with a diameter of 0.120 inch.
 - a. Mesh Size: 2-1/8 inches.
 - b. Zinc-Coated Fabric: ASTM A 392, Type II, Class 1, 1.2 oz./sq. ft. with zinc coating applied before or after weaving.
 - 3. Selvage: Knuckled at both selvages.

ISSUED FOR ADDENDUM 2

JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE

CONTRACT # 7952 MUNIS # 11471

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CHAIN LINK FENCES AND GATES

2.2 FENCE FRAMING

- A. Posts and Rails: Comply with ASTM F 1043 for framing, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 based on the following:
1. Fence Height: As indicated on Drawings.
 2. Light Industrial Strength: Material Group IC-L, round steel pipe, electric-resistance-welded pipe.
 - a. Line Post: 2.375 inches in diameter.
 - b. End, Corner and Pull Post: 2.375 inches.
 3. Brace Rails: Comply with ASTM F 1043.
 4. Metallic Coating for Steel Framing:
 - a. Type A, consisting of not less than minimum 2.0-oz./sq. ft. average zinc coating per ASTM A 123/A 123M or 4.0-oz./sq. ft. zinc coating per ASTM A 653/A 653M.

2.3 TENSION WIRE

- A. Marcellus Steel Wire: 0.177-inch-diameter, marcellus tension wire complying with ASTM A 817 and ASTM A 624, with the following metallic coating:
1. Type II, zinc coated (galvanized) by electrolytic process, with the following minimum coating weight:
 - a. Class 3: Not less than 0.8 oz./sq. ft. of uncoated wire surface.

2.4 SWING GATES

- A. General: Comply with ASTM F 900 for gate posts and double swing gate types.
1. Gate Leaf Width: As indicated.
 2. Gate Fabric Height: As indicated.
- B. Pipe and Tubing:
1. Zinc-Coated Steel: Comply with ASTM F 1043 and ASTM F 1083; protective coating and finish to match fence framing.
 2. Gate Posts: Round tubular steel.
 3. Gate Frames and Bracing: Round tubular steel.
- C. Frame Corner Construction: assembled with corner fittings.
- D. Hardware:
1. Hinges: 180-degree swing.
 2. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.

2.5 FITTINGS

- A. General: Comply with ASTM F 626.
- B. Tie Wires, Clips, and Fasteners: According to ASTM F 626.
1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
 - a. Hot-Dip Galvanized Steel: 0.106-inch-diameter wire.
- C. Finish:
1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz. /sq. ft. zinc.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CHAIN-LINK FENCE INSTALLATION

- A. Post Setting: Set posts with mechanical anchors at indicated spacing.
- B. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment.
- C. Line Posts: Space line posts uniformly at 96 inches o.c.
- D. Post Bracing: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
- E. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch-diameter hog rings of same material

- 1 and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated
2 before stretching fabric. Provide horizontal tension wire at the following locations:
3 1. Extended along top and bottom of fence fabric. Install top tension wire through post cap loops. Install
4 bottom tension wire within 6 inches of bottom of fabric and tie to each post with not less than same
5 diameter and type of wire.
6 F. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 1 inch between finish grade or
7 surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension
8 wires. Anchor to framework so fabric remains under tension after pulling force is released.
9 G. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension
10 bands spaced not more than 15 inches o.c.
11 H. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to
12 chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric
13 per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
14 1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.
15 I. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side.

16 3.3 GATE INSTALLATION

- 17 A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without
18 interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means.
19 Adjust hardware for smooth operation and lubricate where necessary.

20 3.4 ADJUSTING

- 21 A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection,
22 distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range.
23 Confirm that latches and locks engage accurately and securely without forcing or binding.
24 B. Lubricate hardware and other moving parts.

25 END OF SECTION 32 31 13

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28 JULY 2017

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ISSUED FOR ADDENDUM #2
JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE
CONTRACT # 7952 MUNIS # 11471

SECTION 32 91 13
SOIL PREPARATION

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
- 1.2 SUMMARY
- 1.3 ACTION SUBMITTALS
- 1.4 QUALITY ASSURANCE
- 1.5 DELIVERY, STORAGE, AND HANDLING
- 1.6 JOB CONDITIONS

PART 2 - PRODUCTS

- 2.1 MATERIALS

PART 3 - EXECUTION

- 3.1 PREPARATION
- 3.2 PERFORMANCE
- 3.3 FIELD QUALITY CONTROL
- 3.4 CLEANUP AND PROTECTION

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. Furnish and place subsoil, topsoil and planting mixes to meet finished grade elevations.
 - 2. Soil testing of supplemental topsoil and on-site topsoil.
 - 3. Excavation of landscape planting beds including tree pits, turf areas and planters to receive planting mixes or topsoil to the specified depths.
 - 4. Preparation and placement of topsoil and planting mix in landscape planting beds to required finished grades including all soil amendments.
 - 5. Finished grading of all landscape planting beds.
- B. Related Sections:
 - 1. Section 32 93 00 "Plants"

1.3 ACTION SUBMITTALS

- A. Soil Testing
 - 1. Soils report to be obtained by contractor and submitted to the Landscape Architect.
 - 2. Soil testing and report shall be done by Dirt-N-Turf Consulting, Inc. (David Marquardt, 630-251-1511), no outside data shall be accepted. Contractor shall contact soil lab for proper sampling technique and instructions.
 - 3. Tests shall be provided for onsite topsoil, imported topsoil, and blended soil mixes
 - a. Onsite Topsoil
 - 1) Sample shall be raw, unblended soil.
 - 2) Sample quantity: Quantity to be determined by the amount of soil on site. No less than (2) samples shall be provided. Topsoil stock piles over 500 cubic yards shall require min. four (4) samples, one composite from each the north, south, east and west side of the stock pile.
 - 3) Sample size: Provide ¾ of a one gallon bag for each sample.
 - 4) Samples shall be a composite of the site or pile and not a single grab sample.
 - 5) Samples shall be submitted and approved six (6) weeks prior to project start date.
 - 6) If topsoil is hauled off during excavation, site samples shall be taken prior to grading.
 - b. Imported Topsoil
 - 1) Sample shall be raw, unblended soil.
 - 2) Provide samples from (2) possible import locations. Samples shall be a composite of the import source and representative of the soil available at the time of the import.
 - 3) Sample quantity: Provide (2) samples.

- 4) Sample size: $\frac{3}{4}$ of a one gallon bag for each sample.
 - 5) Samples shall be a composite of the site or pile and not a single grab sample.
 - 6) Samples shall be submitted and approved six (6) weeks prior to project start date.
- Blended Planting Mixes
- 1) Samples shall be blended mixed with the approved topsoil (onsite or import) according to the testing labs recommendations.
 - 2) Sample quantity: Provide (3) samples.
 - 3) Sample size: $\frac{3}{4}$ of a one gallon bag
 - 4) Samples shall be a composite of the site or pile and not a single grab sample.
 - 5) Samples shall be submitted and approved two (2) weeks prior to project start date.
4. Testing Parameters
- a. The Contractor shall submit a complete soils report to the Landscape Architect prepared by Dirt-N-Turf Consulting, Inc. (David Marquardt, 630-251-1511). Soils report shall include complete physical and chemical analysis of import topsoil to be used on site, including, but not limited to, the following parameters:
 - 1) U.S.D.A. soil classification
 - Percent of sand
 - Percent of clay
 - Percent of silt
 - 2) Chemical analysis including:
 - Exchange Capacity
 - pH
 - Organic Matter
 - Major Anions
 - Soluble Sulfur
 - Extractable Phosphorus
 - Bray II Phosphorus
 - 3) Major cation's amounts and percentage of base saturation
 - Calcium
 - Magnesium
 - Potassium
 - Sodium
 - Hydrogen
 - 4) Extractable Minors
 - Boron
 - Iron
 - Manganese
 - Copper
 - Zinc
 - Aluminum
 - b. Report shall include recommendations for fertilization and soil amendment for the various types of turf and plants to be installed at the site to provide complete soils that will ensure vigorous growth for all plants specified.
 - c. Report shall identify presence of problem salts, minerals, and heavy metals (including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium and vanadium)
5. Other Samples
- a. The following materials shall be submitted to the Architect for approval prior to delivery to the site.
 - 1) Submit 1 quart samples of imported topsoil, sand, mulch, and soil conditioner to be used in preparation of the planting mix for review.
 - 2) Submit manufacturer's data for fertilizers and amendments recommended by the soil testing analysis.

1.4 QUALITY ASSURANCE

A. Contractor Qualifications:

1. The contractor shall be a company specializing in landscape construction with a minimum of five (5) years of experience on comparable projects.

B. Code and Standards Compliance

1. All materials and work shall comply with applicable codes, standards and with the requirements of local agencies. The Contractor shall obtain all permits required.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Topsoil and Planting Mixtures

1. Coordinate and deliver soil to pre-approved staging areas. Inform the Architect of all delivery schedules, twenty-four (24) hours in advance of delivery.
2. All deliveries of topsoil which in any way fails to meet the requirements of these specifications will be rejected, and the Contractor shall immediately remove such rejected topsoil from the premises and supply suitable topsoil in its place.
3. No deliveries will be permitted when weather conditions are unsatisfactory, or if the approved staging area is not in a satisfactory condition to receive topsoil. No frozen topsoil will be accepted. Do not deliver or handle soil in wet, muddy or frozen conditions. Protect stockpiles from winds and disturbance with landscape fabric or other material.
4. Trucks making deliveries shall use routes as directed to avoid damage to property. The Contractor shall deliver topsoil in dump trucks having pneumatic tires and shall be unloaded from the trucks where directed. All topsoil that is deposited other than in the place designated shall be moved.

B. Other Materials

1. Handle and store all other materials according to manufacturer's recommendations.

1.6 JOB CONDITIONS

A. General

1. Prior to beginning work, the Contractor shall examine and verify the acceptability of the job site and notify the Architect of unsatisfactory conditions. The Contractor shall not proceed with the work until unsatisfactory conditions have been corrected or resolved.
2. Where soil preparation occurs in close proximity to other site improvements, adequate protection shall be given to all features prior to commencing work. Any items damaged during soil preparation operations shall be promptly repaired to their original condition at no addition to the Base Contract Price.

B. Utilities

1. Contractor shall have all underground utilities located by servicing agencies. In the vicinity of utilities, hand excavate to minimize the possibility of damage to underground utilities.

C. Excavation

1. When conditions detrimental to plant growth are encountered such as limestone, rubble fill, adverse drainage conditions, or obstruction, notify the Architect prior to placement of any soil.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Subsoil Fill

1. Where site conditions require a layer of fill below the specified bed depth, provide a clean, debris-free mineral material with a brown sandy clay content and granular material with no stones measuring larger than one inch in diameter. The pH should range between 5.5 to 7.3 with no limestone present. Gray clay soils shall not be accepted.

B. Planting Mixture Materials

1. Amendments

- a. Acceptable and preferred amendments include:

- 1) Pine Bark Fines – Lightly aged
- 2) Coarse sand
- 3) Lightweight aggregates
- 4) Yard waste compost

- b. Unacceptable amendments include:

- c. Mushroom Compost
- d. Hardwood shredded or ground

2. Topsoil

- a. Topsoil shall be a mineral soil, uniform in color and texture; corresponding to native soil; containing no grass roots, sod, weeds, rocks, stiff clay, clods, or any other substance undesirable to plant growth. The soil shall be loose, friable, and of good tilth. The pH shall range between 5.5 to 7.3. Higher pH levels may be approved by Landscape Architect if appropriate for planting types and use.
- b. Organic content shall not be less than 3 percent and not greater than 7 percent determined by loss of ignition.
- c. Gradation: General guide to particle size as follows, may vary depending on use: Amend as needed based on soil test lab recommendations.

Sieve Designation	Percent Passing
No. 4 (4.76 mm)	100
No. 10 (2.00 mm)	95 - 100
No. 18 (1.00 mm)	90 - 100
No. 36 (500 micron)	65 - 100
No. 60 (250 micron)	0 - 50
No. 140 (105 micron)	0 - 20
No. 270 (53 micron)	0 - 10

- d. Textural Grades: General guide to textural grade as follows, may vary depending on use. Amend as needed based on soil test lab recommendations.

Fine gravel, coarse sand, medium sand	25 - 40 %
Silt	25 - 60 %
Clay	5 - 25 %

 Clay content shall be determined by Bouyoucous hydrometer Test.
- e. Sand shall be clean, sharp, coarse sand passing 1/4" mesh screen and free of foreign and organic matter. The pH shall range between 6.5 to 7.5.
- f. Blended Soil (unless otherwise specified after testing) should be the following ratios:

Approved topsoil	60%
Pine fines	20%
Sand	20%

3. Amendments

- a. pH Adjustments Soil pH adjustments will be made based on soil test lab recommendations.
 - 1) Limestone: Calcium carbonate (ground limestone) with 50% passing a No. 200 mesh sieve, 90% passing a NO. 100 mesh sieve and 100% passing a No.10 mesh sieve. Total carbonates shall not be less than 80%.
 - 2) Sulfur: Granular sulfur.

C. Planting Mix Types / Planting Conditions.

1. All on-grade landscape shrub beds and tree pits shall be backfilled with a planting mixture described below. All soil mixtures shall be mixed with amendments and other materials by hand or mechanical methods prior to placement. All topsoil shall be tested and amended per test results. The following mix types shall be tested, prepared and installed for the planting conditions at grade.
2. Planting Mix.
 - a. Depth: 36 inches min. for trees or per the tree installation detail.
 - b. Depth: 18 inches min. for shrub, groundcover, and perennial planting beds or per the shrub installation detail.
 - c. Depth: 3 inches min. for perennials. Place amended soil on the top of the existing soil and till to a depth of 10-12 inches.
3. Turf: Ornamental (low traffic).
 - a. Depth: 6" min. or per the turf installation detail.
4. Turf: High Performance (high traffic).
 - a. Depth: 6" min. or per the turf installation detail.
5. Bioswale / Rain Garden.
 - a. Depth per the installation detail.
6. Planting Mix for Freestanding Planters
 - a. Depth per the installation detail.
 - b. All freestanding planters and planter boxes shall be backfilled with a commercially prepared and approved planting mix which may contain topsoil, sand, pine fines, compost, or lightweight aggregates. Mycorrhizae, pH adjustments and nutrients shall be based on laboratory recommendation.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protection of Site Improvements: Protect all existing site improvements during excavation. If any existing improvements are damaged, replace or make arrangements with the proper authorities for repair.

3.2 PERFORMANCE

- A. Planting Bed Preparation: Prior to installation of any plant material, ensure all tree and shrub pits to be free of debris and not in a muddy condition prior to backfill with specified planting mixture. Loosen the bottom of the pit or bed and ensure that all stones larger than 1" diameter and that all limestone have been removed from the subgrade to a depth of 24 inches.
- B. Landscape Excavation and Backfill
1. Excavate new landscape areas as indicated on the drawings.
- C. Excavate new landscape areas to the following depths:
1. Turf Lawn Area 6" minimum depth
 2. Perennial Beds 12" minimum depth
 3. Shrub Beds 18" minimum depth
 4. Large Shrub and Tree Pits 2' greater than diameter of root ball on each side.
- D. Compact subgrade in planting beds to 85% proctor density. Where pavement and other structures have been removed, bring planting bed to sub-grade with suitable subgrade fill.
- E. After planting beds have been prepared and planting operations completed backfill turf beds and tree pits with specified planting mixtures and to grades and profiles shown on the plans. Rough grading of all areas shall be within 1/10th of grades shown on the Construction Drawings.

3.3 FIELD QUALITY CONTROL

- A. The Contractor will engage an independent soil testing and inspection agency to take samples of installed topsoil and planting soil mixtures and to perform tests and prepare test reports.
1. Testing agency shall conduct and interpret tests, state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.
 2. Testing agency may inspect topsoil at source before shipment; however, Landscape Architect reserves right, at any time before final acceptance, to reject material not complying with specified requirements.
- B. Correct deficiencies in topsoil and planting soil mixture work that inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any noncompliance of original work and to show compliance of corrected work

3.4 CLEANUP AND PROTECTION

- A. Clean Up
1. Debris and excess material shall be removed from the site immediately.
 2. When an excavation or backfill area is completed, completely clean up all soil piles and sweep all walks and drives.
 3. All existing sidewalks and driveways providing access to on-site buildings shall be kept clean and free of obstructions. Other paved areas shall be cleaned when work in adjacent areas is completed
- B. Protection
1. Protect all completed work from disturbance from operations of other trades and trespassers. Replace damaged work to specified conditions.

END OF SECTION

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SECTION 20 05 73
MECHANICAL SYSTEMS FIRESTOPPING

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3 PART 1 - GENERAL
4 1.1 SCOPE
5 1.2 SYSTEM PERFORMANCE REQUIREMENTS
6 1.3 SUBMITTALS
7 1.4 QUALITY ASSURANCE
8 1.5 DELIVERY, STORAGE, AND HANDLING
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10 1.7 COORDINATION
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12 2.1 MANUFACTURERS
13 2.2 MATERIALS
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16 3.1 EXAMINATION
17 3.2 PREPARATION
18 3.3 INSTALLATION
19 3.4 FIELD QUALITY CONTROL
20 3.5 IDENTIFICATION
21 3.6 CLEANING AND PROTECTION

22 PART 1 - GENERAL

23 1.1 SCOPE

- 24 A. Work under this Section includes but is not limited to the following:
25 1. Penetrations through fire-resistance-rated floor, roof, walls, partitions, and smoke barriers including
26 openings containing pipes, ducts and other penetrating items.
27 2. Penetrations through non-fire-resistance-rated floors where vertical service riser penetrates 3 or
28 more floors.

29 1.2 SYSTEM PERFORMANCE REQUIREMENTS

- 30 A. Firestopping systems shall be UL Classified for the application and correspond to those indicated by
31 reference to designations listed by UL Fire Resistance Directory.
32 B. Firestop materials and methods shall conform to requirements of Local Code Authority Having Jurisdiction.

33 1.3 SUBMITTALS

- 34 A. Manufacturer's specifications and product data for each type of product including composition and
35 limitations, documentation of UL Certification for firestopping systems to be used and manufacturer's
36 installation instructions.
37 B. Material safety data sheets provided with product delivered to job-site.

38 1.4 QUALITY ASSURANCE

- 39 A. Installer Qualifications: Firm experienced in installing penetration firestopping similar in material, design,
40 and extent to that indicated for this Project, whose work has resulted in construction with a record of
41 successful performance. Qualifications include having necessary experience, staff, and training to install
42 manufacturer's products per specified requirements.

43 1.5 DELIVERY, STORAGE AND HANDLING

- 44 A. Deliver products to project site in original, unopened containers or packages with intact and legible
45 manufacturers' labels identifying product, type and UL Label where applicable.
46 B. Store materials to prevent deterioration or damage due to moisture, temperature changes, contaminants or
47 other causes.
48 C. Handle in accordance with recommended procedures, precautions or remedies described in material safety
49 data sheets as applicable.

50 1.6 PROJECT CONDITIONS

- 51 A. Do not install firestopping when ambient or substrate temperatures are outside limits permitted by
52 firestopping manufacturers or when substrates are wet because of rain, frost, condensation or other causes.

ISSUED FOR ADDENDUM #2

JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE

CONTRACT # 7952 MUNIS # 11471

20 05 73 - 1

MECHANICAL SYSTEMS FIRESTOPPING

- 1 B. Install and cure firestopping per manufacturers' written instructions using natural ventilation or, where this is
2 inadequate, forced-air circulation.

3 **1.7 COORDINATION**

- 4 A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed
5 according to specified requirements.
6 B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration
7 firestopping.
8 C. ~~Notify Owner's-Contractor's testing agency at least seven (7) days in advance of penetration firestopping~~
9 ~~installations; confirm dates and times on day preceding each series of installations.~~

10 **PART 2 - PRODUCTS**

11 **2.1 MANUFACTURERS**

- 12 A. 3M, Hilti, Tremco, Nelson Firestop Products, Specified Technologies, Inc. (STI), or Dectro Seal Corp.
13 B. Pro-set firestop products may be used for specific applications, provided products meet requirements in this
14 Section.
15 C. HydroFlame water/firestop sleeves may be used for specific applications provided products meet
16 requirements in this Section.

17 **2.2 MATERIALS**

- 18 A. Use only firestop products that have been UL 1479, ASTM E814 Tested for specific fire-rated construction
19 conditions conforming to construction assembly type, penetrating item type, annular space requirements
20 and fire-rating involved for each separate instance.
21 B. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits
22 for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
23 1. Sealants: 250 g/L
24 2. Sealant Primers for Nonporous Substrates: 250 g/L
25 3. Sealant Primers for Porous Substrates: 775 g/L
26 C. Where UL classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory"
27 under product Category XHEZ.

28 **2.3 MIXING**

- 29 A. For those products requiring mixing before application, comply with through-penetration firestop system
30 manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing
31 equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed
32 to produce products of uniform quality with optimum performance characteristics for application indicated.

33 **PART 3 - EXECUTION**

34 **3.1 EXAMINATION**

- 35 A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening
36 configurations, penetrating items, substrates, and other conditions affecting performance of firestopping.
37 B. Proceed with installation only after unsatisfactory conditions have been corrected.

38 **3.2 PREPARATION**

- 39 A. Clean out openings immediately before installing firestopping to comply with manufacturer's written
40 instructions.
41 B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended
42 products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed
43 surfaces.
44 C. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.

45 **3.3 INSTALLATION**

- 46 A. Install penetration firestopping to comply with manufacturer's written installation instructions and published
47 drawings for products and applications.

- 1 B. Install forming materials and other accessories of types required to support fill materials during application.
2 After installing fill materials and allowing materials to fully cure, remove forming materials and other
3 accessories not indicated as permanent components of firestop systems.
4 C. Avoid multiple penetrations of common fire barrier opening. Seal each penetration in accordance with
5 manufacturer's UL installation details. When multiple penetrations are unavoidable, seal openings with
6 appropriate UL Classified firestopping systems.

7 **3.4 FIELD QUALITY CONTROL**

- 8 A. Inspecting Agency: ~~Owner-Contractor~~ will engage a qualified independent inspecting agency to inspect
9 Through-Penetration Firestop Systems and to prepare test reports.
10 B. Inspecting agency will state in each report whether inspected Through-Penetration Firestop Systems comply
11 with or deviate from requirements.
12 C. Provide certification by Installer that all Through-Penetration Firestop Systems have been firestopped in
13 accordance with applicable Building Codes of this State.
14 D. Proceed with enclosing Through-Penetration Firestop Systems with other construction only after inspection
15 reports are issued.
16 E. Where deficiencies are found, repair or replace Through-Penetration Firestop Systems so they comply with
17 requirements.

18 **3.5 IDENTIFICATION**

- 19 A. Identify Through-Penetration Firestop Systems with preprinted metal or plastic labels. Attach labels
20 permanently to surfaces adjacent to and within 6" of firestopping edge so labels will be visible to anyone
21 seeking to remove penetrating items or firestop systems. Use mechanical fasteners or self-adhering type
22 labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include
23 the following information on labels:
24 1. The words: "Warning--Through-Penetration Firestop System—Do Not Disturb. Notify Building
25 Management of Any Damage."
26 2. Contractor's name, address, and phone number.
27 3. Designation of applicable testing and inspecting agency.
28 4. Date of installation.
29 5. Manufacturer's name.
30 6. Installer's name.

31 **3.6 CLEANING AND PROTECTION**

- 32 A. Clean surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as
33 Work progresses.
34 B. Provide final protection and maintain conditions during and after installation that ensure that penetration
35 firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection,
36 damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration
37 firestopping and install new materials to produce systems complying with specified requirements.

38 **END OF SECTION**

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SECTION 23 21 16
PIPE AND PIPE FITTINGS

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- 5 1.2 DESCRIPTION
- 6 1.3 SUBMITTALS
- 7 1.4 QUALITY ASSURANCE
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- 12 PART 2 - PRODUCTS
- 13 2.1 ABOVE GROUND PIPE, FITTINGS AND JOINTS Under (5 psig)
- 14 2.2 VENTS AND RELIEF VALVES
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- 19 2.7 STAINLESS STEEL PIPING (304)
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- 22 2.10 UNIONS AND FLANGES
- 23 2.11 THREADED JOINT SEALANTS
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- 25 2.13 REFRIGERANT PIPING
- 26 PART 3 - EXECUTION
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- 43 3.17 HYDRONIC FLUSHING AND CLEANING PIPING SYSTEMS
- 44 3.18 GAS AND FUEL OIL SYSTEM FLUSHING AND CLEANING
- 45 3.19 PIPE PAINTING

46 PART 1 - GENERAL

- 47 1.1 RELATED WORK
- 48 A. Section 20 0529 - Mechanical Supporting Devices
- 49 B. Section 23 0902 - Control Valves and Damper (Valves)
- 50 C. Section 23 0903 - Control Instrumentation (Wells, Taps or In-line Devices)
- 51 D. Section 23 2116 Pipe and Pipe Fittings
- 52 E. Section 23 2118 - Valves
- 53 F. Section 23 2120 - Piping Specialties
- 54 G. Section 26 3213 - Engine Generators

- 1 1.2 DESCRIPTION
- 2 A. Specification of an item in this or any other sections shall not relieve Contractor from providing all items,
3 articles, materials, operations, methods, labor, equipment and incidentals necessary for a complete and
4 functional system.
- 5 B. Use only new material, free of defects, rust and scale, and guarantee for services intended.
- 6 C. Use material meeting the latest revision of ASTM specifications as listed in this specification.
- 7 D. Follow local codes if they require other types of pipe or joints.
- 8 E. Use only long radius elbows having centerline radius of 1.5 pipe diameters unless otherwise indicated.
- 9 F. Manufacturer, pressure class, size and heat code of each fitting and flange shall be permanently identified
10 on its body in accordance with MSS SP-25.
- 11 G. Where size for a pipe segment is not indicated, the pipe segment size shall be equal to the largest pipe
12 segment to which it is connected. Transition to smaller size shall occur on the side of fitting where smaller
13 size is indicated.
- 14 H. Unless otherwise indicated, fittings and accessories connected to pipe shall be of the same material as the
15 pipe.
- 16 I. Unless otherwise indicated, construct piping for highest pressures and temperatures in respective system
17 in accordance with the latest revision of the applicable Sections of ASME Code for pressure piping, ASME
18 B31 including the following:
- 19 1. B31.5 Refrigeration Piping
- 20 2. B31.8 Gas Transmission and Distribution Piping Systems
- 21 J. Non-metallic piping is acceptable only for services indicated. It is not acceptable in occupied spaces and
22 ventilation plenum spaces.
- 23 1.3 SUBMITTALS
- 24 A. Shop Drawings for each piping system for all pipe sizes including, but not limited to, the following:
- 25 1. Name of system
- 26 2. Pipe; ASTM number, grade if known, type, wall thickness, material
- 27 3. Fittings; ASME number, grade if known, class, type, wall thickness, material
- 28 4. Joint type
- 29 5. Valves
- 30 6. Regulators
- 31 7. Flanges; ASTM number, grade, class, type, material
- 32 8. Bolts and nuts; material
- 33 9. Thread joint sealants; material
- 34 10. Flange gaskets; material, rating
- 35 11. Unions; ASTM number, type, material, rating
- 36 12. Type of welding
- 37 13. Welding Quality Control Program
- 38 14. Test pressure and media
- 39 15. Pipe flushing/cleaning plan
- 40 16. Pipe cleaning method
- 41 17. All other appropriate data
- 42 B. Submit pipe certification as specified under Pipe Certification in this Section.
- 43 C. Submit required documents as specified under Pipe Welding in this Section.
- 44 D. Provide Flushing and Cleaning Plan:
- 45 1. Submit pipe flushing/cleaning plan for water, fluid, natural gas systems for approval. Plan shall detail
46 methods for compliance with requirements of this section, including:
- 47 a. Flushing and cleaning procedure narratives.
- 48 b. Size, power source, and connection points of contractor provided pumps that will be used for
49 flushing and cleaning.
- 50 c. Method of sectionalizing piping to obtain required velocity.
- 51 d. Minimum velocities at each section of pipe, clearly indicating any sections where 6 fps cannot
52 be achieved.
- 53 e. Location and means of temporary bypasses for coils, control valves and other equipment.
- 54 f. Flushing schedule and drawings or diagrams that will be used for inspection and sign off prior
55 to and after procedure, at Owner's option.
- 56 2. Submit documents showing verification of flushing/cleaning following specified requirements and
57 results.

1 1.4 QUALITY ASSURANCE

- 2 A. Order piping with each length marked with manufacturer's name or trademark and type of pipe; with each
3 shipping unit marked with purchase order number, metal or alloy designation, temper, size, and supplier's
4 name.
5 B. Installed material not meeting specification requirements must be replaced with material that meets these
6 Specifications without additional cost to Owner.
7

8 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- 9 A. Promptly inspect shipments to insure material is undamaged and complies with specifications.
10 B. Cover pipe to prevent corrosion or deterioration while allowing sufficient ventilation to avoid condensation.
11 Do not store materials directly on grade. Protect pipe, tube, and fitting ends from damage. End caps shall
12 remain in place. Protect fittings, flanges, and unions by storage inside or by durable, waterproof, above
13 ground packaging.
14 C. Off-site storage agreements will not relieve Contractor from using proper storage techniques.
15 D. Storage and protection methods must allow inspection to verify products.

16 1.6 NATURAL GAS SERVICE

- 17 A. Contact local gas company for cost of gas service to building, including pressure reducing valves, if required,
18 and gas meter. Include this cost in Bid.
19 B. All charges for gas service as shown on drawings including connection from main in street or other location
20 to gas meter shall be paid by this Contractor. This includes setting of gas meter and work performed by Gas
21 Company.
22 C. Gas service, meters and regulating equipment will be installed by gas company on inlet side of meters.
23 D. Cost of gas service, meters and regulating equipment to inlet side of meters will be paid by Gas Company.

24 1.7 PIPE WELDING

- 25 A. Procedure and Welding Qualification Records:
26 1. Submit Welding Procedure Specifications (WPSs) and their supporting Procedure Qualification
27 Records (PQRs) to be used on the work to Engineer for review and approval prior to performing any
28 welding. These documents shall meet requirements of ASME B31.1 and B31.9, as applicable.
29 2. Unless otherwise indicated, welding shall be done using only the following processes:
30 a. Shielded Metal Arc Welding (SMAW), also known as "stick" welding.
31 b. Gas Tungsten Arc Welding (GTAW), also known as TIG and Heliarc welding
32 c. Gas Metal Arc Welding (GMAW), also known as MIG welding
33 d. Flux-Cored Arc Welding (FCAW), a variation of GMAW
34 e. Submerged Arc Welding (SAW)
35 3. Unless otherwise stated, fabrication, installation, inspection, examination and testing shall be in
36 accordance with ASME B31.1 or B31.9, as applicable.
37 4. Backing rings (chill rings) or consumable inserts are not allowed, unless specifically requested by
38 Owner or Engineer.
39 B. Weld Inspection and Examination:
40 1. Provide examination services for all welding for this Project. Examination shall be in accordance with
41 requirements of ASME B31.1, Table 136.4 or B31.9, as applicable.
42 2. Periodically, as welding progresses, submit report, signed by weld examiner, indicating status of
43 project welding quality.
44 3. Arrange with ~~Owner's~~ Contractor's Inspector for observation of fitup and welding methods prior to
45 implementing any welds, including shop welds, on this Project.
46 4. In addition, ~~Owner's~~ Contractor's Inspector will perform any additional observations deemed
47 necessary before, during, or after fabrication to assure, to Owner's satisfaction, that proper welding
48 is provided. Owner reserves the right to perform independent examination of welds. If Owner has
49 any concern as a result of such examination Owner reserves the right to stop in progress welding
50 work, without any cost to Owner, until resolution satisfactory to Owner is reached.
51 C. Welder Qualifications:
52 1. Each welder and welding operator must qualify by passing required procedure test before performing
53 any project welds. Submit copy of Manufacturer's Record of Welder or Welding Operator
54 Qualification Tests (WPQS) as required by Section IX of ASME Boiler and Pressure Vessel Code for
55 all welding procedures to be performed by welding operator.
56 2. Welder qualifications must be current. If qualification test is more than 6 months old, provide record
57 of welding continuity for each welder.

- 1 3. Record of welding continuity is intended to show that welder has performed welding at least every 12
2 months since the date that welder qualification test was passed for the submitted welding procedure
3 specification.
4 4. Record of welding continuity shall include, at minimum, the following:
5 a. Welder's employer name and address
6 b. Date Welder Qualification Test was passed
7 c. Dates indicating welding continuity
8 5. Welders shall be qualified as required by ASME B31.1 or B31.9, as applicable. In addition, there
9 shall be an independent witness of welder tests. That witness shall be representative of independent
10 testing laboratory, Authorized (Code) Inspector, Owner's or Engineer's Inspector or consultant
11 approved by National Certified Pipe Welding Bureau.
12 6. Welder qualifications must cover all pipe sizes and wall thickness used on this project. Test
13 segments or coupons shall be appropriately selected for qualification. Test position shall be arranged
14 in "3G over Pipe."
15
16 D. Weld Record:
17 1. For welding within the scope of ASME B31.1 Power Piping, submit to Engineer for approval an
18 administrative procedure for recording, locating, monitoring and maintaining quality of welds to be
19 performed on the project. This quality control document record shall include but not be limited to:
20 a. Drawings and schedules identifying location of each weld by individual number, identification
21 of welder who performed each weld by individual welder's name, stamp number, date, and
WPS used.

22 1.8 PIPE CERTIFICATION

- 23 A. Certification is required for all pipe within scope of ASME B31.1. Submit certification papers, as outlined
24 below, within 30 days of delivery of pipe to project site.
25 B. Type E or S Pipe:
26 1. Furnish manufacturer's mill certificates (material test report) including dimensions, heat numbers,
27 chemical analysis and tensile test results for pipe shipped to project site.

28 PART 2 - PRODUCTS

29 2.1 NATURAL GAS PIPE, FITTINGS AND JOINTS UNDER (5 PSIG)

- 30 A. 2" and Smaller:
31 1. Pipe: ASTM A53, Grade A or B, Type E, or ASTM A106, Grade B, standard weight, (Schedule 40),
32 carbon steel
33 2. Fittings: ASTM A197/ANSI B16.3 Class 150, black malleable iron, threaded
34 3. Joints: Threaded
35 B. 2-1/2" and Larger:
36 1. Pipe: ASTM A53, Grade B, Type E or S, standard weight, (Schedule 40), carbon steel
37 2. Fittings: ASTM A234 Grade WPB/ANSI B16.9, standard weight, (Schedule 40), seamless, carbon
38 steel, welded
39 3. Joints: Welded

40 2.2 VENTS AND RELIEF VALVES

- 41 A. Unless otherwise indicated, use pipe and pipe fittings as indicated for the system to which relief valve or
42 vent is connected.
43 B. ASTM A53, Type F, carbon steel pipe with standard weight, carbon steel fittings may be used for steam
44 vents smaller than 4".
45 C. Use ASTM A53, Type E carbon steel pipe with ASTM A234 Grade WPB/ASME B16.9, standard weight,
46 seamless carbon steel weld fittings for refrigerant vent piping.

47 2.3 METERS

- 48 A. Meters shall be provided by the local utility.

49 2.4 COOLING COIL CONDENSATE DRAIN

- 50 A. Piping shall be one of the following, unless otherwise indicated on drawings:
51 1. Pipe: ASTM A53, Type F, standard weight, galvanized steel
52 2. Fittings: ASTM A126/ASME B16.4, cast iron, threaded, ASTM A123 galvanize coated
53 3. Pipe: ASTM B88, Type M, hard temper copper tubing

- 1 4. Fittings: ASTM B16.22 wrought copper fittings
2 5. Joint: ASTM B32, 95-5 tin-antimony solder, Bridgit or Silvabrite
- 3 **2.5 ENGINE EXHAUST**
4 A. All Sizes:
5 1. Pipe: ASTM A312, 304, Schedule 10S, seamless stainless steel
6 2. Fittings: ASTM A403, Gr. WP, Class S or Class W, ASME 16.9, stainless steel welded
7 B. All Sizes:
8 1. Factory-built double wall piping system by Metalbestos, AMPCO, Metal Fab
- 9 **2.6 STAINLESS STEEL PIPING (304)**
10 A. 2" and Smaller:
11 1. Pipe: ASTM A312, 304, Schedule 10S, seamless stainless steel
12 2. Fittings: ASTM 182, Gr. F304, ASME B16.11, 3000 lb socket-weld
13 3. Unions: 3000 lb socket-weld, stainless steel ground joint
14 B. 2-1/2" and Larger:
15 1. Pipe: ASTM A312, 304, Schedule 10S, seamless stainless steel
16 2. Fittings: ASTM A403, Gr. WP, Class S or Class W, ASME 16.9
17 3. Flanges: ASTM A182, Gr. F304, ASME B16.5, 150 lb std. with 1/16" raised face, serrated face finish
18 and welding neck
19 4. Bolts: Stud bolts, ASTM A193, Gr. B7
20 5. Nuts: ASTM A194, Gr. 2H
- 21 **2.7 DIELECTRIC UNIONS, FLANGES AND FITTINGS (STEEL PIPE TO COPPER PIPE)**
22 A. 2" and Smaller:
23 1. Use bronze ball valves specified in Section 23 2118 for dielectric purpose.
24 2. Dielectric fittings similar to Victaulic Style 647 or Clearflow Dielectric Waterway fittings may be used
25 in lieu of dielectric unions for pipe sizes 2" and smaller.
26 a. Clearflow fittings shall be ASTM A53 electro zinc-plated steel pipe with high temperature
27 polyolefin polymer liner, suitable for continuous use at temperatures up to 230°F and
28 pressures up to 300 psig.
29 3. ASTM A197/ASME B16, equal to Stockham Figure 693-1/2, Watts Series 3000 or Wilkins (Zurn)
30 Model DU series dielectric unions with EPDM dielectric gasket, 250 psi at 180°F.
31 B. 2-1/2" through 4":
32 1. Watts dielectric flange fittings Series LF 3100/LF 3110 with dielectric gasket, 175 psi at 180°F.
33 2. Dielectric fittings similar to Victaulic Style 647 or Clearflow Dielectric Waterway fittings may be used
34 in lieu of dielectric unions for pipe sizes 2-1/2" and larger.
35 a. Clearflow fittings shall be ASTM A53 electro zinc-plated steel pipe with high temperature
36 polyolefin polymer liner, suitable for continuous use at temperatures up to 230°F and
37 pressures up to 300 psig.
- 38 **2.8 DIELECTRIC UNIONS, FLANGES AND FITTINGS (STEEL TO STEEL PIPE)**
39 A. 1" and Smaller: Similar to Epco model HA-B with dielectric gasket, 250 psi at 210°F
40 B. 1-1/2" and Larger: Similar to Epco model W with bolt insulators, dielectric gasket, bolts and nuts, 175 psi at
41 210°F). Pikotek model VSC dielectric gasket with viton sealing element, G-10 sleeve and double washers,
42 suitable to 350°F, may be used with specified flanges.
- 43 **2.9 UNIONS AND FLANGES**
44 A. Unions:
45 1. 2" and Smaller: Malleable iron, ASME B16.39 with ground joint, bronze or brass to iron. Provide
46 black malleable iron for carbon steel piping and galvanized malleable iron for galvanized steel piping.
47 Unless otherwise specified, pressure class and joint type of union shall be equal to that specified for
48 fittings of respective piping service. Minimum pressure class of unions shall be Class 250.
49 2. 2" and Smaller: Forged steel, ASTM A105 Grade 2, ASME B16.11, 3000 lb WOG with steel to steel
50 seats. Joint type shall match that specified for fittings of respective piping service.
51 B. Flanges:
52 1. 2-1/2" and Larger: ASTM A105, ASME B16.5, hot forged steel, welding neck pattern. Slip-on pattern
53 are not allowed. Bore dimension of welding neck flange shall match inside diameter of connected
54 pipe.
55 2. Use raised face flanges for mating with other raised face flanges with self-centering flat ring gaskets.
56 Use flat face flanges for mating with other flat face flanges with full face gaskets.

- 1 3. Flange pressure class indicated in respective piping service is minimum required. Mating flange
2 pressure class shall match pressure class of connected device, such as valves and piping specialties.
- 3 C. Flange Gaskets:
- 4 1. General - Gasket material shall be asbestos free and suitable for pressures, temperatures and fluid
5 of respective piping system. Non-metallic gaskets shall be in accordance with ASME B16.21 and
6 ASTM F104.
- 7 2. Service Temperature (through 249°F) - Garlock, Klingersil or J.M. Clipper, similar to Garlock 5500.
8 Gaskets similar to Garlock 5500 may be used for hydronic piping. Unless otherwise indicated
9 or recommended by manufacturer, gaskets shall be compressed inorganic fiber with nitrile binder
10 1/16" thick for flanges 12" and smaller and 1/8" thick for flanges 14" and larger.
- 11 3. Service Temperature (250°F thru 800°F) - Flexitallic, Garlock, Lamos equal to Flexitallic Style LS,
12 flexible graphite filler, 304 SS winding, carbon steel centering ring, 0.175" thickness.
- 13 4. Service Temperature (801°F thru 1500°F) - Flexitallic, Garlock, Lamos equal to Flexitallic Style CG,
14 flexible graphite filler, 316 SS winding, carbon steel centering ring, 0.175" thickness.
- 15 5. Service Temperature (1501°F thru 1700°F) - Flexitallic, Garlock, Lamos equal to Flexitallic Style CG,
16 flexible graphite filler, Inconel 600 winding, 316 SS centering ring, 0.175" thickness.
- 17 D. Bolting:
- 18 1. Bolts, bolt studs, nuts and washers shall have zinc plated finish.
- 19 2. Thread shall be in accordance with ASME B1.1, Class 2A tolerance for external threads and Class
20 2B tolerance for internal threads. Threads shall be coarse-thread series except that alloy steel bolting,
21 1/8" and larger in diameter shall be 8 pitch thread series.
- 22 3. Threaded rods are not allowed as fastening elements.
- 23 4. For Class 150 and Class 300 flanges, use carbon steel bolts or stud bolts conforming to ASTM A307,
24 Grade B for service temperature up to 400°F and ASTM A193, Grade B7 for service temperature up
25 to 800°F with nuts conforming to ASTM A194.
- 26 a. Bolts conforming to ASTM A307, Grade A may be used for piping governed by ASME B31.9.
- 27 5. For Class 400 and 600 flanges at 800°F or lower temperature, use alloy steel bolts or stud bolts
28 conforming to ASTM A193, Grade B7 or B16, with nuts conforming to ASTM A194, Grade 2H.
- 29 2.10 **THREADED JOINT SEALANTS**
- 30 A. Paste type for brush application or cord type. Products shall be non-toxic, chemically inert, non-hardening,
31 rated for -50°F to 400°F and up to 10,000 psi (liquids) and 2000 psi (gases), certified by UL, CSA, and NSF.
- 32 B. Use sealant similar to Loctite Model 54531 for piping handling oil or petroleum products.
- 33 2.11 **WELD BRANCH OUTLET FITTINGS (WELDOLETS, THREDOLETS AND SOCKOLETS)**
- 34 A. Weld branch outlet fittings shall conform to MSS-SP-97, ASME B16.9 for weldolets, ASME B1.20.1 for
35 thredolets and ASME B16.11 for sockolets.
- 36 B. Materials shall match material of header piping and wall thickness of outlet or branch end shall match wall
37 thickness of branch pipe.
- 38 2.12 **REFRIGERANT PIPING**
- 39 A. ASTM B88 Type L hard drawn copper tube, cleaned and capped in accordance with ASTM B280, and
40 marked "ACR" with ANSI B16.22 wrought copper or forged brass solder-type fittings.

41 **PART 3 - EXECUTION**

42 **3.1 GENERAL**

- 43 A. Install gas piping according to requirements of this Section, local gas utility, NFPA 54 National Fuel Gas
44 Code, AGA pamphlets and as shown on drawings.
- 45 B. Piping through roof to be run through approved roof penetration with flashing and counter flashing.
- 46 C. Grounding to gas piping is prohibited.
- 47 D. Gas piping shall be installed with dirt legs adjacent to equipment and with drain tees and plugs at low points.
- 48 E. Gas piping in plenum ceilings shall have welded joints.
- 49 F. Install gas piping above ground in buildings.
- 50 G. Pitch horizontal piping downward at 1" per 60 ft in direction of flow toward risers or appliances. Install
51 minimum of 4" deep dirt leg at bottom of each vertical run and at each appliance. When installing mains and
52 branches, cap gastight each tee or pipe end, which will not be immediately extended. Take branch
53 connections to main from top or side of main.

- 1 H. Make threaded joints by cutting pipe square and reaming inside. Threads shall be cut so exposed threads
2 do not exceed 3 in number. Protect exposed threads against corrosion. Use only joint compounds approved
3 for gas piping.
- 4 I. Do not route piping through transformer vaults or above transformers, panelboards, or switchboards,
5 including the required service space for this equipment, unless piping is serving this equipment.
- 6 J. Remove foreign materials before erection. Ream ends of piping to remove burrs.
- 7 K. Install piping parallel to building walls and ceilings and at such heights so as not to obstruct any portion of
8 window, doorway, stairway, or passageway. Install piping to allow adequate service space for equipment.
9 Refer to drawings and/or manufacturer's recommendations. Install vertical piping plumb. Where
10 interferences develop in field, offset or reroute piping as required to clear such interferences. In all cases,
11 consult drawings for exact location of pipe spaces, ceiling heights, door and window openings or other
12 architectural details before installing piping.
- 13 L. Provide anchors, expansion joints, swing joints and expansion loops so that piping may expand and contract
14 without damage to itself, equipment or building.
- 15 M. Mitered elbows, welded branch connections, notched tees and "orange peel" reducers are not allowed.
16 Unless specifically indicated, reducing flanges and reducing bushings are not allowed. Reducing bushings
17 may be used for air vents and instrumentation connections.
- 18 N. Unless otherwise indicated, use fittings as specified in Part 2 of this Section for elbows, tees, reducers, etc.
- 19 O. "Weldolets" with outlet size 2-1/2" and larger and "Threadolets" or "Sockolets" with outlet size 2" and smaller
20 may be used for branch connections up to one pipe size smaller than main. Use "Threadolets" where
21 threaded fittings are specified and use "Sockolets" where socket weld fittings are specified. Install in
22 accordance with PFI (Pipe Fabrication Institute) Standard ES49.
- 23 P. Install drains throughout systems to permit complete drainage of entire system.
- 24 Q. Do not install piping over electrical panelboards, switchgear, switchboards or motor control centers.
- 25 R. Install valves, control valves and piping specialties, including items furnished by others, as specified and/or
26 detailed.
- 27 S. Make connections to equipment installed by others where that equipment requires piping services indicated
28 in this Section.
- 29 T. For piping within the scope of ASME B31.1 Power Piping, transfer piping material specification and "Heat
30 Number" to each segment of pipe prior to cutting.
- 31 **3.2 PRESSURE REGULATORS**
- 32 A. Pressure regulator at gas meter provided by gas company.
- 33 B. Install regulators in accordance with manufacturer's instructions.
- 34 C. Regulator shall be accessible for maintenance and protected from fire and mechanical damage. Regulator
35 shall be supported from structure by brackets and supports.
- 36 D. Vent from relief valve shall be routed to outside. Terminate vent with protection screen and return bend. If
37 above ground vent terminates in area subject to snow accumulation, terminate line at least 5 ft above grade.
38 Coordinate vent routing with other trades to point of termination. Size vents in accordance with regulator
39 manufacturer's requirements for regulator flow rate and length of run.
- 40 E. Provide unions on both sides of regulators for removal and maintenance.
- 41 F. Provide gas cock for pressure verification.
- 42 **3.3 METERS**
- 43 A. Verify transmission of signal to the Building Automation System.
- 44 **3.4 CONNECTIONS**
- 45 A. Shutoff valves shall be accessible in case of emergency; installed minimum of 5 ft from equipment. Provide
46 shutoff valves at each piece of equipment.
- 47 **3.5 THREADED PIPE JOINTS**
- 48 A. Threads of pipe and fittings shall conform to ASME B1.20.1.
- 49 B. Ream pipe ends after cutting and clean before erection. Apply thread sealants to cleaned male threads.
50 Assemble joint to appropriate depth and remove any excess pipe joint compound from tightened joint.
- 51 **3.6 FLANGED JOINTS**
- 52 A. Clean flange surfaces and align them parallel. Bolt holes of gaskets shall be cut slightly larger than bolt
53 diameter. Gasket ID shall be slightly larger than flange ID.
- 54 B. Position gasket concentrically so compression is equally distributed over entire gasket surface.
- 55 C. Lubricate bolts and run nuts down by hand.

- 1 D. Using torque wrench, tighten nuts in the proper sequence so gasket is compressed evenly, and to the
2 appropriate torque specified by bolt manufacturer.
3 E. Re-torque bolts 12 to 24 h after start up.

3.7 WELDED PIPE JOINTS

- 5 A. Inspect pipe and pipe fittings for roundness before they are fit-up or set in place.
6 B. Properly clean and prepare pipe base material before fit-up. Verify joint land and bevel.
7 C. Preheat pipe base material as required by welding procedure specification. Temperature of pipe material
8 must be minimum of 50°F before welding.
9 D. Properly align and adjust joint as required by welding procedure and thickness of material. Verify alignment
10 after tacking sequence.
11 E. Use weld material diameter as procedurally required for type and thickness of work being done.
12 F. Use sufficient argon pre-purge and argon post-purge for GTAW procedure. Post-purge should be until weld
13 is no longer glowing plus 5 seconds. Match pre-purge to at least 2 times of weld material.
14 G. Properly store welding materials.
15 H. Clean tacks before welding out. Remove slag after each pass by grinding to avoid slag inclusion.
16 I. Weld reinforcement shall not exceed limits established in Chapter V of ASME B31.1.
17 J. Brush each weld free of rust and paint with rust resistant product that matches piping surface color.
18 K. For piping within scope of ASME B31.1, each weld shall be permanently marked by welder performing weld.
19 Each welder shall sign and date field welding log record for all welds performed by welder as indicated in
20 Part 1.
21 L. Conduct radiographic test for sections or joints that cannot be tested by hydrostatic test methods (such as
22 joints cut into existing piping systems) by qualified radiographic testing firm.

3.8 COPPER PIPE JOINTS

- 23 A. Cutting of tubing shall not make tubing out of round. Ream cut tube ends to full inside diameter.
24 B. Remove slivers and burrs remaining from tube cut by reaming and filing both pipe surfaces. Clean fitting
25 and tube with emery or sand cloth. Remove residue from cleaning operation, apply flux and assemble joint.
26 Use solder or brazing to secure joint as specified for specific piping service.
27 C. Press Joint Option:
28 1. Cut pipe square and ream before assembly
29 2. Insert pipe fully into fitting and mark on pipe at shoulder of fitting
30 3. Check fitting alignment against mark on pipe to ensure pipe is fully engaged
31 4. Press joint with press tool approved by fitting manufacturer
32

3.9 COOLING COIL CONDENSATE DRAIN

- 34 A. Trap each cooling coil drain pan connection with trap seal of sufficient depth to prevent conditioned air from
35 moving through piping. Extend drain piping to nearest code approved drain location. Construct trap with
36 plugged tee for cleanout purposes.
37 B. Pitch pipe down at 1/4" per one foot for proper drainage.
38 C. Where copper piping is allowed, joints and fittings may be secured with 95-5 tin-antimony solder or brazing
39 alloys.

3.10 ENGINE EXHAUST

- 41 A. Install engine exhaust lines where indicated on drawings, including mufflers, flexible connections and other
42 required exhaust line components furnished with engine. Isolate piping as indicated in Vibration Isolation
43 section of these Specifications. Pitch horizontal piping down and away from muffler to drain point where
44 pipe rises. Install drain valve at this point on muffler body if it has provision for drain connection, and at all
45 low points in exhaust line where condensate may collect. Drain valves to be accessible without use of
46 ladder.
47 B. Exhaust pipes passing directly through combustible roofs to be guarded at point of passage by ventilated
48 metal thimbles which extended not less than 9" above and not less than 9" below roof construction and
49 which are at least 6" in diameter larger than vent pipe.
50 C. Terminate exhaust piping with vent cap.

3.11 DIELECTRIC UNIONS AND FITTINGS

- 52 A. Install dielectric unions, flanges or fittings in main and branch piping of water systems at each point where
53 copper to steel pipe connection occurs. Dielectric unions or fittings shall not be used at terminal device
54 connections.
55 B. Concealed dielectric unions and fittings are not allowed.

- 1 C. Install steel to steel pipe dielectric unions or flanges in [hot water] [chilled water] [steam and steam
2 condensate] piping at each point where interior steel piping is connected to exterior underground steel
3 piping.
- 4 **3.12 UNIONS AND FLANGES**
- 5 A. Install union or flange at each automatic control valve and at each piping specialty or piece of equipment
6 that requires tube pull or removal for maintenance, repair or replacement. If required, provide additional
7 unions or flanges in order to facilitate removal of piping sections that interfere with tube pulls or equipment
8 removal. Where valve is located at piece of equipment, provide flange or union connection on equipment
9 side of valve.
- 10 B. Concealed unions or flanges are not allowed.
- 11 **3.13 REFRIGERANT PIPING**
- 12 A. Install refrigerant piping system to meet requirements of Wisconsin Department of Industry, Labor and
13 Human Relations Refrigeration Code.
- 14 B. Solder joints shall be ASTM Grade 4 or 5 and have melting point of approximately 1250°F. Solder impurities
15 shall not exceed 0.15%. Tubing shall be new and delivered to job site with original mill end caps in place.
16 Clean and polish joints before soldering. Avoid prolonged heating and burning during soldering. Purge
17 pipes with nitrogen during soldering. Provide manual shut-off and check valves as required.
- 18 C. Leak test by charging system to pressure of 10 psig with the same type of refrigerant that will be used in the
19 system.
- 20 D. Charge refrigerant into system through Sporlan catchall filter-drier. Finally increase pressure to 300 psig
21 with oil pumped dry nitrogen. Rap joints with rubber or rawhide mallet and check for leaks with electric leak
22 detector having certified sensitivity of at least one ounce per year. Seal any leaks that may be found and
23 retest.
- 24 E. After completion of leak test, evacuate system with vacuum pump to 2.5 mm Hg absolute as measured on
25 accurate gauge.
- 26 F. System ambient temperature shall be above 60°F during evacuation, charge refrigerant into system to 0
27 psig, then repeat evacuation to 2.5 mm Hg absolute. Allow system to stand evacuated for at least 12 h. If
28 no noticeable rise in pressure occurs, system may be charged.
- 29 G. Charge system with new refrigerant through charging valve and filter-drier. Continue charging until bubbles
30 disappear from liquid line sight glass while compressor is in operation.
- 31 H. Refrigeration piping must be installed by firms who are experienced in installation of such piping.
- 32 **3.14 HYDRONIC SYSTEM PRESSURE TESTS**
- 33 A. Owner and/or Owner's representative may elect to witness pressure test. Notify Owner and/or Owner's
34 representative at least 3 days in advance.
- 35 B. Conduct pressure test prior to flushing and cleaning of piping systems.
- 36 C. Conduct hydrostatic test in accordance with ASME B31.1 137.4. Test pressure shall be in accordance with
37 ASME B31.1, but shall not be lower than a minimum 100 psig test pressure.
- 38 D. If leaks are found, repair with new materials and repeat test until leaks are eliminated. Caulking will not be
39 acceptable.
- 40 E. Pressure tests may be made of isolated portions of piping systems to facilitate general progress of
41 installation. Any revisions made in piping systems require retesting of affected portions of piping systems.
- 42 F. No systems shall be insulated until it has been successfully tested. If required for additional pressure load
43 under test, provide temporary restraints at expansion joints or isolate them during test. Unless otherwise
44 noted, minimum test time shall be 4 h plus such additional time as may be necessary to conduct examination
45 for leakage.
- 46 G. No pressure drop shall occur during test period. Any pressure drop during test period indicates leakage.
- 47 H. Provide pumps, gauges, instruments, test equipment, temporary piping and personnel required for tests and
48 provide removal of test equipment and draining of pipes after tests have been made.
- 49 I. For hydrostatic tests, remove air from piping being tested by means of air vents. Measure and record test
50 pressure at high point in system. Where test pressure at high point in system causes excessive pressure at
51 low point in system due to static head, portions of piping system may be isolated and tested separately to
52 avoid undue pressure. However, every portion of piping system must be tested at the specified minimum
53 test pressure.
- 54 J. If piping system is drained after testing and left empty or untreated for more than 3 days, add Nalco 2572 at
55 recommended dosages for dry system lay-up.
- 56 **3.15 HYDRONIC FLUSHING AND CLEANING PIPING SYSTEMS**
- 57 A. Notify Owner and/or Owner's representative at least 7 days in advance.

- 1 B. Flush fluid systems thoroughly for 15 minutes or longer, as required to ensure removal of dirt and foreign
2 matter from piping system.
3 C. Flush gas piping with clean, dry compressed air for one (1) h minimum. Open and clean drip legs. Repeat
4 flushing until no debris is found in drip legs.

5 **3.16 GAS AND FUEL OIL SYSTEM TESTING**

- 6 A. Conduct Pneumatic test with test medium of dry, oil free air, carbon dioxide, or nitrogen for natural gas, and
7 fuel oil piping and in accordance with ASME B31.1 137.4.
8 B. Test above ground steel gas piping with dry compressed air at 50 psi for 2 h. Soap test of each joint shall
9 be done to detect leaks during 2 h period. No loss of pressure allowed during test period. No piping shall
10 be concealed until successfully tested.
11 C. Types and extent of non-destructive examinations required for pipe welds are as shown in Table 136.4 of
12 ASME Code for Pressure Piping, ANSI/ASME B31.1 - Power Piping. If requirements for non-destructive
13 examination are to be other than that stated above, degree of examination, and basis for rejection shall be
14 matter of prior written agreement between fabricator, or Contractor and purchaser.

15 **3.17 GAS AND FUEL OIL SYSTEM FLUSHING AND CLEANING**

- 16 A. Before actuation of gas system, flush system with dry nitrogen to ensure clean system free of oil and
17 construction debris.

18 **3.18 PIPE PAINTING**

- 19 A. Exposed exterior carbon steel, black iron or other ferrous pipe and fittings shall be prepared and painted by
20 qualified painters using corrosion inhibitive paints. Pipe shall be prepared in accordance with paint
21 manufacturer's instructions and primed (2 coats) and finish painted (2 coats). Paint type shall be approved
22 by Architect/Engineer.
23 B. Protect piping from weather and paint promptly to prevent corrosion.

24 **END OF SECTION**

SECTION 23 51 00

SMOKESTACK, BREECHING AND VENT PIPING

- 1
- 2
- 3 PART 1 - GENERAL
- 4 1.1 RELATED WORK
- 5 1.2 SUBMITTALS
- 6 1.3 DESIGN CRITERIA
- 7 PART 2 - PRODUCTS
- 8 2.1 GAS HEATER VENTING SYSTEM
- 9 2.2 ENGINE EXHAUST EXPANSION JOINTS
- 10 2.3 ENGINE EXHAUST VENT PIPE ROOF CURB
- 11 PART 3 - EXECUTION
- 12 3.1 INSTALLATION

13 PART 1 - GENERAL

14 1.1 RELATED WORK

- 15 A. Section 20 0700 - Mechanical Systems Insulation
- 16 B. Section 23 2116 Pipe and Pipe Fittings

17 1.2 SUBMITTALS

- 18 A. Shop Drawings including, but not limited to, the following:
 - 19 1. Manufacturer's name
 - 20 2. Pressure/temperature ratings
 - 21 3. Materials of construction
 - 22 4. Dimensions and weights
 - 23 5. Thermal characteristics
 - 24 6. Erection and supporting methods
 - 25 7. Finish
 - 26 8. Manufacturer's installation instructions*
 - 27 9. All other appropriate data
- 28 B. Submit the following information for welded sheetmetal ductwork:
 - 29 1. Welding Procedure Specification (WPS) for welded joints. Form to be similar to ANSI/AWS D9.1-90 Code, Appendix "D".
 - 30 2. Procedure Qualification Record (PQR) for each WPS. Form to be similar to ANSI-AWS D9-1-90 Code, Appendix "E".
 - 31 3. Welder Qualification Test Record (satisfactory performance) for each field or shop welder. Form similar to ANSI/AWS D9.1-90 Code, Appendix "F".

35 1.3 DESIGN CRITERIA

- 36 A. All products, fabrication and installation shall comply with requirements of NFPA 211 together with State and Local Codes.
- 37

38 PART 2 - PRODUCTS

39 2.1 GAS HEATER VENTING SYSTEM

- 40 A. Vent piping shall have outer jacket of 0.025" thick aluminized coated steel and inner of 0.015" thick Type 430 stainless steel with 1/2" insulating air space.
- 41
- 42 B. Provide vents complete with all necessary accessories including flashing, counter flashing, storm collar, insulated thimble, guides, rain cap, clean out, fittings, and all necessary supports.
- 43

44 2.2 ENGINE EXHAUST EXPANSION JOINTS

- 45 A. Expansion joints shall be factory fabricated and made of Type 321 stainless steel bellows with carbon steel flanges.
- 46
- 47 B. Minimum design pressure and temperature shall be 15 psig and 1000°F.
- 48 C. Joints shall be Hyspan Series 2500 or approved equal.

- 1 2.2 ENGINE EXHAUST PIPE ROOF CURB
2 A. Provide drain, roof flashing, counterflashing and necessary supports.
3 B. Provide minimum 12" height insulated metal roof curb, constructed of 20 gauge galvanized steel with high
4 density insulation.
5 PART 3 -

6 PART 3 - EXECUTION

- 7 3.1 INSTALLATION
8 A. Install stack, vents and expansion devices as shown on drawings, details and in accordance with
9 manufacturer's recommendations. Coordinate carefully with General Contractor.
10 B. Support breechings ~~exhaust vent and breechings~~ adequately from building structure with ~~anchors or for~~
11 ~~breeching~~ expansion and contraction. Provide drain, roof flashing, counterflashing and necessary
12 supports.
13 C.

14 END OF SECTION

SECTION 27 00 00

GENERAL COMMUNICATIONS REQUIREMENTS

- 1
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- 4 1.1 SCOPE
- 5 1.2 DESCRIPTION
- 6 1.3 RELATED WORK
- 7 1.4 REQUIREMENTS FOR REGULATORY AGENCIES
- 8 1.5 REFERENCES AND STANDARDS
- 9 1.6 ABBREVIATIONS AND ACRONYMS
- 10 1.7 DEFINITIONS
- 11 1.8 WORK BY OWNER
- 12 1.9 QUALITY ASSURANCE
- 13 1.10 SUBMITTALS
- 14 1.11 WARRANTY
- 15 PART 2 - PRODUCTS
- 16 2.1 GENERAL
- 17 2.2 LISTING
- 18 2.3 PRODUCT SUBSTITUTIONS
- 19 PART 3 - EXECUTION
- 20 3.1 GENERAL
- 21 3.2 WORK SEQUENCE
- 22 3.3 BUILDING ACCESS
- 23 3.4 DAMAGE
- 24 3.5 DELIVERY, STORAGE, AND HANDLING
- 25 3.6 LOCATIONS OF WORK
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- 27 3.8 CUTTING AND PATCHING
- 28 3.9 FLOOR, WALL, ROOF, AND CEILING OPENINGS
- 29 3.10 EQUIPMENT ACCESS
- 30 3.11 EQUIPMENT SUPPORTS
- 31 3.12 SUPPORT PROTECTION
- 32 3.13 INSTALLATION
- 33 3.14 PAINTING
- 34 3.15 UTILITY SERVICES
- 35 3.16 CABLE AND CONDUCTOR PROTECTION
- 36 3.17 TESTING
- 37 3.18 START-UP
- 38 3.19 ATTIC STOCK
- 39 3.20 DOCUMENTATION
- 40 3.21 CLEANING
- 41 3.22 TRAINING

42 PART 1 - GENERAL

- 43 1.1 SCOPE
- 44 A. This section details references, standards, guidelines, requirements and conditions common to all Division
- 45 27 work.
- 46 B. Systems constituting the Division 27 scope of work include, but are not limited to:
- 47 1. Structured Cabling
- 48 2. Two Way Emergency Communication
- 49 3. Emergency Responder Radio Reinforcement
- 50 4. Communications Grounding and Bonding
- 51 5. Firestopping
- 52 C. Work under this Section and related sections is subject to requirements of Contract Documents including
- 53 General Conditions, Supplementary Conditions, and sections under Division 01 General Requirements.
- 54 1.2 DESCRIPTION
- 55 A. Intent of drawings and specifications is to obtain complete, turnkey systems which are furnished, installed,
- 56 configured, tested, adjusted, and made completely ready for operation.

- 1 B. Contract documents are performance-based and diagrammatic, intended to convey the scope of work,
2 design intent, and general arrangement of devices, equipment, etc. and define the minimum material quality,
3 required features, operational requirements, and performance of the systems. Contract documents do not
4 convey every required conductor, every required component, or every required configuration or programming
5 detail. Information provided in contract documents is as exact as could be secured but is not guaranteed.
6 Contractor is solely responsible for determining devices, components, equipment, accessories, wiring,
7 connections, terminations, configuration, programming, etc. to provide a complete and operational turnkey
8 system that satisfies the scope of work and design intent conveyed.
- 9 C. Except as otherwise specified in detail, terms "provide", "furnish" and "install" as used in Division 27
10 contract documents shall have the following meanings:
11 1. "Provide" shall mean "furnish, install, configure, test, adjust, etc. and make completely ready for
12 operation".
13 2. "Furnish" does not include installation, configuration, testing, adjusting, etc.
14 3. "Install" shall mean "install, configure, test, adjust, etc. and make completely ready for operation" but
15 does not include furnishing.
- 16 D. Contractor is solely responsible for determination of quantities of material, devices, equipment, etc. based
17 on the information provided in the contract documents. Where discrepancies arise, the general number shall
18 govern.
- 19 E. Work related to communications in contract documents of other Divisions of Work shall be included as part
20 of work under this Division.
- 21 F. If work and/or material, devices, equipment, etc. is depicted on the drawings, required in the specifications,
22 specified in other contract documents, or necessary for proper operation and satisfying the scope of work
23 and design intent conveyed, it shall be considered part of this contract. Contractor shall include in their bid
24 costs associated with the work and material, devices, equipment, etc. depicted on the drawings, required in
25 the specifications, specified in other contract documents, and necessary for proper operation and satisfying
26 the scope of work and design intent conveyed.

27 **1.3 RELATED WORK**

- 28 A. Related Division 27 Sections include:
29 1. Section 27 0526 - Grounding and Bonding for Communications Systems
30 2. Section 27 0528.29 - Hangers and Supports for Communications Systems
31 3. Section 27 0528.33 - Raceway and Boxes for Communications Systems
32 4. Section 27 0553 - Communications Systems Identification
33 5. Section 27 1000 - Structured Cabling
34 6. Section 27 1100 - Communications Equipment Room Fittings
35 7. Section 27 1500 - Communications Horizontal Cabling
36 8. Section 27 5129 - Emergency Communication System
37 9. Section 27 5319 - Emergency Responder Radio Coverage System
- 38 B. Related Divisions of Work and related sections in other Divisions of Work:
39 1. Division 01 - General Requirements
40 a. Section 01 5000 - Temporary Facilities and Controls
41 b. Section 01 524 - Construction Waste Management
42 2. Division 03 - Concrete
43 3. Division 06 - Wood, Plastics, and Composites
44 a. Section 06 1000 - Rough Carpentry
45 4. Division 07 - Thermal and Moisture Protection
46 a. Section 07 8400 - Firestopping
47 b. Section 07 9200 - Joint Sealants
48 5. Division 08 - Openings
49 6. Division 09 - Finishes
50 7. Division 10 - Specialties
51 8. Division 11 - Vehicle and Pedestrian Equipment
52 9. Division 12 - Furnishings
53 a. Section 12 5900 - Systems Furniture
54 10. Division 14 - Conveying Equipment
55 a. Section 14 2000 - Elevators
56 11. Division 21 - Fire Suppression
57 12. Division 22 - Plumbing
58 13. Division 23 - Heating, Ventilating, and Air Conditioning (HVAC)
59 14. Division 25 - Integrated Automation
60 15. Division 26 - Electrical

- 1 a. Section 26 0526 - Grounding and Bonding for Electrical Systems
2 b. Section 26 0529 - Hangers and Supports for Electrical Systems
3 c. Section 26 0533 - Raceway and Boxes for Electrical Systems
4 d. Section 26 0536 - Cable Trays for Electrical Systems
5 e. Section 26 0553 - Electrical Systems Identification
6 f. Section 26 0593 - Electrical Systems Firestopping
7 16. Division 28 - Electronic Safety and Security
8 C. Refer to individual technical sections identified above for additional related sections.
- 9 1.4 REQUIREMENTS OF REGULATORY AGENCIES
10 A. Rules and regulations of Federal, State, and local authorities and of utility companies serving the project site
11 in force at time of execution of contract shall become part of this specification.
12 B. Perform work in accordance with laws, codes, regulations, ordinances, etc. of the jurisdiction in which the
13 project site is located and in accordance with Owner's published standards.
14 C. Perform work in accordance with referenced standards, guidelines, and industry best practices.
15 D. Perform work in accordance with manufacturer's instructions, guidelines, recommendations, etc.
16 E. Where a discrepancy exists between laws, codes, regulations, ordinances, guidelines, industry best
17 practices, Owner's published standards, manufacturer's instructions, manufacturer's guidelines,
18 manufacturer's recommendations, etc. and contract documents, the most stringent requirement or direction
19 that complies with laws, codes, regulations, and ordinances shall govern.
20 F. Changes to work conveyed by the contract documents made after the letting of the contract to comply with
21 applicable laws, codes, regulations, ordinances, Owner's published standards, or contract documents or to
22 comply with the requirements of the Authority Having Jurisdiction shall be made by the Contractor without
23 any cost to the Owner.
24 G. Contractor shall include in their bid costs to procure permits, licenses, approvals, etc. applicable to work
25 performed, including:
26 1. Costs to prepare documents for applications, submittals, etc. for review by Authority Having
27 Jurisdiction
28 2. Application, submittal, etc. charges, fees, taxes, etc.
29 H. Contractor shall include in their bid costs for inspections of work performed related to permits, licenses,
30 approvals, etc. or laws, codes, regulations, ordinances, or Owner's published standards.
- 31 1.5 REFERENCES AND STANDARDS
32 A. Design, products, installation, and completed work shall conform with following:
33 1. ANSI/NFPA 70 - National Electrical Code
34 2. Local Electrical Code
35 3. Country, state and local health, safety and building codes
36 4. ANSI/IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power
37 Systems
38 5. ANSI/IEEE 1100 - Recommended Practice for Power and Grounding Sensitive Electronic Equipment
39 in Industrial and Commercial Power Systems
40 6. ANSI/TIA 455-21-A: Mating Durability for Fiber Optic Interconnecting Devices
41 7. ANSI/TIA-526-7: Optical Power Loss Measurements of Installed Single-mode Fiber Cable Plant
42 8. ANSI/TIA 526-14A: Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
43 9. ANSI/TIA 568-C.0 through C.3 - Commercial Building Telecommunications Cabling Standard
44 (including applicable Addenda)
45 10. ANSI/TIA 569-B - Commercial Building Standard for Telecommunications Pathways and Spaces.
46 11. TIA-598-C: Optical Fiber Cable Color Coding.
47 12. TIA-606-B - Administration Standard for the Telecommunications Infrastructure of Commercial
48 Buildings.
49 13. ANSI J-STD-607-C - Commercial Building Grounding (Earthing) and Bonding Requirements for
50 Telecommunications
51 14. ANSI/TIA-758 - Customer-Owned Outside Plant Telecommunications Cabling Standard
52 15. ASTM A 123 - Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled,
53 Pressed, and forged Steel Shapes, Plates, Bars, and Strip.
54 16. ASTM A 446 - Specification for Zinc-Coated (Galvanized) by Hot-Dip Process, Structural (Physical)
55 Quality.
56 17. ASTM A 525 - Specification for Steel Sheet, Zinc-Coated Galvanized by Hot Dip Process.
57 18. ASTM A 607 - Specification for Steel Sheet and Strip, Hot-rolled and Cold-Rolled, High Strength,
58 Low Alloy Columbium or Vanadium.
59 19. ASTM B 633 - Specification for Electro-deposited Coatings of Zinc on Iron and Steel.

- 1 20. BICSI Telecommunications Distribution Methods Manual (TDMM)
- 2 21. IEEE 81 – IEEE Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface
- 3 Potentials of a Ground System Part 1: Normal Measurements
- 4 22. IEEE 802.3af and 802.3at Power-over-Ethernet Standards.
- 5 23. IEEE 802.3an 10 Gigabit Standard
- 6 24. IEEE 837 – Standard for Qualifying Permanent Connections Used in Substation Grounding.
- 7 25. NETA 780 – Standard for the Installation of Lightning Protection Systems
- 8 26. NEMA VE 1 - Metal Cable Tray Systems.
- 9 27. NEMA VE 2 - Cable Tray Installation Guidelines
- 10 28. UL 5 - Surface Metal Raceways and Fittings
- 11 29. UL 5A - Nonmetallic Surface Raceways and Fittings
- 12 30. UL 94 – Tests for Flammability of Plastic Materials for Parts in Devices and Appliances
- 13 31. UL 96 – Lightning Protection Components
- 14 32. UL 96A – Installation Requirements for Lightning Protection Systems
- 15 33. UL 144 – Communications Cables
- 16 34. UL 167 Electrical Grounding and Bonding Equipment
- 17 35. UL-910: Tests for Flame Propagation and Smoke-Density Values for Electrical and Optical-Fiber
- 18 Cables used in Spaces Transporting Environmental Air
- 19 36. UL-1666: Tests for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed
- 20 Vertically in Shafts
- 21 B. Design, cable and component selection, and installation practices shall also conform with additional
- 22 standards identified in individual Technical Sections.
- 23 C. Work shall be in accordance with latest edition of codes, standards or specifications unless noted otherwise.

24 1.6 ABBREVIATIONS AND ACRONYMS

- 25 A. Agencies or publications referenced herein refer to the following:
- 26 1. ANSI American National Standards Institute
- 27 2. ASME American Society of Mechanical Engineers
- 28 3. ASTM American Society for Testing and Materials
- 29 4. BICSI Building Industry Consulting Services International
- 30 5. EIA Electronic Industries Alliance
- 31 6. FIPS Federal Information Processing Standards
- 32 7. FCC Federal Communications Commission
- 33 8. ICEA Insulated Cable Engineers Association
- 34 9. IEEE Institute of Electrical and Electronics Engineers
- 35 10. NEC National Electrical Code
- 36 11. NECA National Electrical Contractors Association
- 37 12. NEMA National Electrical Manufacturers Association
- 38 13. NESC National Electrical Safety Code
- 39 14. NETA National Electrical Testing Association
- 40 15. NFPA National Fire Protection Association
- 41 16. NIST National Institute of Standards and Technology
- 42 17. OSHA Occupational Safety and Health Administration
- 43 18. TIA Telecommunications Industry Association
- 44 19. UL Underwriters Laboratories, Inc.
- 45 B. The following abbreviations and acronyms shall apply to this document and its companion sections for
- 46 clarification and direction.
- 47 1. 8P8C Eight-Position, Eight-Conductor. Used in clarifying jack type; a.k.a. "RJ-45".
- 48 2. AFF Above Finished Floor
- 49 3. ATM Asynchronous Transfer Mode
- 50 4. AWG American Wire Gauge
- 51 5. BAS Building Automation Systems
- 52 6. BTU British Thermal Unit
- 53 7. °C degrees Celsius
- 54 8. CATV Community Antenna Television
- 55 9. CCTV Closed-Circuit Television
- 56 10. CDDI Copper Distributed Data Interface (Cisco Systems trade name for TP-PMD)
- 57 11. cm centimeters
- 58 12. CM Communications cable rated for General Purpose use
- 59 13. CMP Communications cable rated for use in Plenum areas
- 60 14. CMR Communications cable rated for use in Risers and vertical runs

LOTHAN VAN HOOK DESTEFANO ARCHITECTURE LLC
28 JULY 2017

1	15.	CP Consolidation Point
2	16.	DTMF Dual Tone Multi Frequency
3	17.	EIA Electronic Industries Alliance
4	18.	EF Entrance Facility
5	19.	ELFEXT Equal-Level Far-End Cross Talk (pair-to-pair)
6	20.	ER Entrance Room
7	21.	EIDF Equipment Intermediate Distribution Facility
8	22.	°F degrees Fahrenheit
9	23.	FDDI Fiber Distributed Data Interface
10	24.	FEXT Far-End Cross Talk
11	25.	ft feet
12	26.	F/UTP Foiled Unshielded Twisted Pair
13		No shielding around individual pairs and an overall foil shield under the cable jacket
14	27.	GbE Gigabit Ethernet
15	28.	HC Horizontal Cross-connect
16	29.	HCP Horizontal Connection Point (e.g. for TIA-862)
17	30.	Hz Frequency in Hertz (k = kilo, M = Mega, G = Giga)
18	31.	ID Inside Diameter
19	32.	IDF Intermediate Distribution Frame
20	33.	in inch
21	34.	IPT IP Telephony
22	35.	kg kilogram
23	36.	lbs pounds
24	37.	LAN Local Area Network
25	38.	MATV Master Antenna Television
26	39.	MC Main Cross-connect
27	40.	MDF Main Distribution Frame
28	41.	m meters
29	42.	mm millimeters
30	43.	Mbps Megabits per second
31	44.	µm micrometer (10 ⁻⁶ meter)
32	45.	N Newton
33	46.	NEXT Near End Cross Talk
34	47.	OD Outside Diameter
35	48.	OFNP Optical Fiber Nonconductive Plenum
36	49.	OFNR Optical Fiber Nonconductive Riser
37	50.	OTDR Optical Time Domain Reflectometer
38	51.	PBX Private Branch Exchange (Telephone Switch)
39	52.	pF pico-Farad (10 ⁻¹² Farad)
40	53.	PoE Power-over-Ethernet
41	54.	PSNEXT Power Sum Near End Cross Talk
42	55.	PVC Polyvinyl Chloride
43	56.	RU Rack Unit
44	57.	S/FTP Screened Foiled Twisted Pair
45		(Individual foil shield around each individual pair and an overall braided shield under the cable jacket.)
46		
47	58.	SF/UTP Screened Foiled Unshielded Twisted Pair
48		(No shielding around individual pairs and overall foil and braided shields under the cable jacket.)
49		
50	59.	sq ft square feet (area)
51	60.	S/UTP Screened Unshielded Twisted Pair
52		(No shielding around individual pairs and an overall braided shield under the cable jacket.)
53	61.	TO Telecommunications Outlet
54	62.	TP-PMD Twisted Pair Physical Layer Medium
55	63.	TR Telecommunications Room
56	64.	U/FTP Unshielded Foiled Twisted Pair
57		(Individual foil shield around each individual pair and no overall braided shield under the cable jacket.)
58		
59	65.	UTP Unshielded Twisted Pair
60		(No shielding around pairs nor overall under cable jacket.)
61	66.	USOC Universal Service Order Code
62	67.	VoIP Voice over Internet Protocol

ISSUED FOR ADDENDUM #2

JUDGE DOYLE SQUARE – BLOCK 88 PARKING GARAGE

CONTRACT # 7952 MUNIS # 11471

27 00 00 - 5

GENERAL
COMMUNICATIONS REQUIREMENTS

- 1 68. WAN Wide Area Network
- 2 69. WLAN Wireless Local Area Network
- 3 C. Refer to technical sections for additional terminology.

4 1.7 DEFINITIONS

- 5 A. Acceptance: Expressed approval
- 6 B. The following definitions are applicable to telecommunications environments and shall apply to this document and its companion sections for clarification and direction:
 - 7 1. "10-gigabit" or "10G" - Performance criteria, refers to support of 10Gbps application over 4-
 - 8 conductor channel up to 100 meters and meeting requirements of TIA-568 C.2.
 - 9 2. Backbone Cabling - cable or conductors between telecommunications rooms, or floor distribution
 - 10 terminals, entrance facilities, and equipment rooms within or between buildings. Backbone cabling
 - 11 may be twisted pair copper, fiber optic or coaxial.
 - 12 3. Cable - assembly of 1 or more conductors or optical fibers within enveloping sheath, constructed so
 - 13 as to permit use of conductors singly or in groups.
 - 14 4. Cable ID - unique alpha-numeric identification used for tagging of backbone or horizontal cabling.
 - 15 5. Channel - end-to-end transmission path to which application-specific equipment is connected, known
 - 16 as "Permanent Link", but also includes patch cords at Telecommunications Outlet and in Telecom
 - 17 Room.
 - 18 6. Consolidation Point (CP): A location for interconnection between horizontal cables extending from
 - 19 the horizontal cross-connect and horizontal cables extending to the telecommunication outlet at the
 - 20 workstation.
 - 21 7. Contractor: Telecommunications Contractor or sub-contractor(s) responsible for installation,
 - 22 termination, test and documentation of communications cabling, termination components, pathway
 - 23 hardware, telecommunications equipment room hardware and related components detailed in
 - 24 technical sections of this Division of work.
 - 25 8. Cross-Connect - group of connection points between cabling runs and/or equipment used to
 - 26 administer building wiring using patch cords or wire jumpers.
 - 27 9. Entrance facility - an entrance to building for both public and private network service cables and/or
 - 28 wireless services including entrance point of building and continuing to Entrance Room.
 - 29 10. Entrance Room - room where both public and private network service cables and/or wireless services
 - 30 are terminated. Service provider(s) point-of-demarkation (DEMARC) is typically located here.
 - 31 11. Communications Equipment Room / Equipment Room (Telecom): an environmentally controlled
 - 32 centralized space for telecommunications equipment that usually houses main or intermediate cross-
 - 33 connect. Backbone cabling, cabling to Building Entrance and horizontal cabling may be terminated
 - 34 here.
 - 35 12. Guarantee - promise or an assurance that attests to quality or durability of product or service or that
 - 36 task will be performed in specified manner. Used interchangeably with "Warranty" in these
 - 37 documents.
 - 38 13. Horizontal Cabling - Cables connecting Telecommunications Outlets to horizontal or intermediate
 - 39 cross-connect. Sometimes referred to as "Station Cabling".
 - 40 14. Horizontal Cross-connect (HC) - Connection of horizontal cabling to other cabling (e.g. horizontal,
 - 41 backbone or equipment) using patch cords or wire jumpers.
 - 42 15. Interconnection - Connection scheme using connecting hardware for the direct connection of a cable
 - 43 to another cable without a patch cord or jumper
 - 44 16. Inter-building - between 2 or more buildings.
 - 45 17. Intra-building - within single building.
 - 46 18. IP Telephony - Use of Internet Protocol (IP) for two-way transmission of conversations. Sometimes
 - 47 referred to as "Voice over Internet Protocol (VoIP)".
 - 48 19. Main Cross-connect (MC) - Connection between backbone cables, entrance cables and equipment
 - 49 cables using patch cords or wire jumpers.
 - 50 20. Outlet ID - unique alpha-numeric identification used for referencing Telecommunications Outlet or
 - 51 connectors therein.
 - 52 21. Permanent (Cable) Link - includes Telecommunications Outlet, horizontal (station) cable and
 - 53 termination hardware in Telecom Room.
 - 54 22. Rack Unit - standard measurement of vertical mounting space on an equipment rack. Each Rack
 - 55 Unit is 1-3/4" high.
 - 56 23. Service Loop - Surplus cable, typically located at or near point of termination to enable future
 - 57 changes.
 - 58

- 1 24. Telecommunications Outlet (TO) - device assembly located in work area on which horizontal cabling
- 2 terminates and which can receive modular connectors. It is interface between Station Cable and end
- 3 user's equipment.
- 4 25. Telecom Room - an enclosed space for housing telecommunications equipment, horizontal and
- 5 backbone cable terminations, and cross-connect cabling, that is recognized location of horizontal
- 6 cross-connect.
- 7 26. Voice over Internet Protocol – Refer to IP Telephony.
- 8 27. Zone Box - An enclosure used to house one or more of the following; a) a consolidation point, b) a
- 9 horizontal connection point, c) building automation system outlets.
- 10 28. Zone Cabling - Extends permanent horizontal cabling to a shared termination (consolidation) point in
- 11 the work area. Passive system extends link to workstation through at interconnect at the
- 12 Consolidation Point (CP). Active system includes system electronics at the CP.
- 13 C. Typical NEMA Enclosures and Usage
- 14 1. Refer to Section 26 0000 – General Electrical Requirements.
- 15 2. NEMA 1 - Indoors. Falling dirt
- 16 3. NEMA 2 - Indoors. Falling dirt. Falling liquids. Light splashing
- 17 4. NEMA 3 - Outdoors. Sleet, snow, rain. Windblown dust
- 18 5. NEMA 3X - Same as NEMA 3 plus corrosion resistant
- 19 6. NEMA 3S - Same as NEMA 3 plus mechanism operable when ice covered
- 20 7. NEMA 3SX - Same as NEMA 3S plus corrosion resistant
- 21 8. NEMA 3R - Outdoors. Rain, snow, sleet
- 22 9. NEMA 3RX - Same as NEMA 3R plus corrosion resistant
- 23 10. NEMA 4:
- 24 a. Indoors - Falling dirt. Falling and light splashing liquids. Flying dust, lint and fibers. Hose
- 25 down
- 26 b. Outdoors - Rain, sleet, snow. Wind blown dust. Hose down
- 27 11. NEMA 4X - Same as NEMA 4 plus corrosion resistant
- 28 12. NEMA 5 - Indoors. Falling Dirt. Falling Liquids. Settling dust, lint and fibers
- 29 13. NEMA 6:
- 30 a. Indoors - Falling dirt. Falling and light splashing liquids. Flying dust, lint and fibers. Hose
- 31 down. Temporary submersion.
- 32 b. Outdoors - Rain, snow, sleet. Windblown dust. Hose down. Temporary submersion.
- 33 14. NEMA 6P:
- 34 a. Indoors - Same as NEMA 6 / Indoors plus corrosion resistant. Prolonged submersion.
- 35 b. Outdoors - NEMA 6 /Outdoors plus corrosion resistant. Prolonged Submersion.
- 36 15. NEMA 7 - Indoors. Class I, Division 1 or 2, Groups A, B, C or D. (Flammable gas).
- 37 16. NEMA 9 - Indoors. Class II, Division 1 or 2. Groups E, R, or G. (Combustible dust).
- 38 17. NEMA 12 - Indoors. Falling Dirt. Falling liquids. Flying dust, lint and fibers. Oil or coolant seepage.
- 39 18. NEMA 13 - Same as NEMA 12 plus oil or coolant spraying or splashing.

40 1.8 WORK BY OWNER

- 41 A. Owner will provide:
- 42 1. Telecommunications service:
- 43 a. Voice
- 44 b. Data Circuit / Internet
- 45 2. Active Telephone Equipment:
- 46 a. Head End/Controller
- 47 b. Telephones
- 48 c. Fax machines
- 49 d. Modems
- 50 3. Active Ethernet Networking Equipment:
- 51 a. Modems
- 52 b. Routers
- 53 c. Firewalls
- 54 d. Wireless Ethernet access points
- 55 e. Printers
- 56 f. Scanners
- 57 4. Computer Equipment:
- 58 a. Server computers
- 59 b. Storage appliances
- 60 c. Workstation computers

- 1 5. Patch cables to make connections to telecommunications service, active telephone equipment,
2 active Ethernet networking equipment, computer equipment, and active television equipment unless
3 noted otherwise.

4 1.0 QUALITY ASSURANCE

5 Refer to the individual technical sections for general product quality requirements, manufacturer
6 qualifications, and contractor qualifications and certification requirements.

7 a. Products

- 8 1. Only products of reputable manufacturers, as determined by the Architect/Engineer, will be
9 acceptable. Manufacturers shall have a minimum of five (5) years of documented experience in
10 designing, manufacturing, delivering, and supporting the specified material.
11 2. Where contract documents require a product, material, or assembly that hasn't been specified by
12 brand or trade name, provide product, material, or assembly that meets the specified requirements,
13 as supplied and warranted by the system vendor. If system vendor does not offer product, material,
14 or assembly, provide product, material, or assembly per system vendor's recommendation.

15 C. Contractor

- 16 1. Contractor shall have a minimum of five (5) years' documented experience providing and installing
17 the specified devices, components, equipment, and materials, and a minimum of five (5) years'
18 documented history of being current on manufacturer's training and certifications applicable to the
19 specified systems, devices, components, equipment, and materials they propose for use on the
20 project.
21 2. Contractor shall be qualified by the manufacturer to offer and support manufacturer warranties
22 applicable to the specified systems, devices, components, equipment, and materials they propose
23 for use on the project.
24 3. Contractor's staff assigned as site superintendent and foreman and Contractor's staff assigned to
25 perform installation, termination, configuration, programming, and testing shall be individually
26 certified by the manufacturer on the specified systems, devices, components, equipment, materials,
27 etc. proposed and approved for use on the project.
28 4. Contractor shall have an in-house service department staffed with technicians who are manufacturer-
29 certified to install and service specified systems, devices, components, equipment, materials, etc.
30 they propose for use on the project, and who are equipped with tools, equipment, materials, etc.
31 necessary to install and service specified devices, components, equipment, materials, etc. they
32 propose for use on the project.

33 D. Contractor's in-house service division/department/staff shall offer maximum 4-hour on-site service
34 call response time 24 hours a day, 7 days a week, 365(6) days a year.

- 35 1. Contractors and subcontractors shall only employ workers who are properly trained to execute the
36 work being performed and are skilled in their trade.
37 2. Contractors and subcontractors shall own and maintain equipment, tools, etc. to execute the work
38 performed in a manner consistent with laws, codes, regulations, ordinances, standards, guidelines,
39 industry best practices, manufacturer's instructions, etc.. Workers shall be properly trained in the
40 use of equipment, tools, etc. necessary for them to complete the work performed.
41 3. Contractor shall submit with shop drawings documentation of compliance with requirements listed
42 above. Inability to demonstrate compliance with requirements listed above shall disqualify Contractor
43 from self-performing the work conveyed by the contract documents, and Contractor shall then, at no
44 additional cost to Owner, subcontract with another firm qualified to perform the work.

45 1.10 SUBMITTALS

46 A. General:

- 47 1. Refer to Division 01 for additional information and requirements.
48 2. Refer to individual technical sections for additional information and requirements.
49 3. Submittals shall be prepared and submitted in electronic form and/or in printed hard copy form per
50 Division 01.
51 a. Unless noted otherwise, documents submitted in electronic form shall be in .pdf format.
52 1) Electronic files shall be submitted on USB flash drive storage media.
53 b. Unless noted otherwise, documents submitted in printed hard copy form shall be printed
54 directly from electronic files and shall be clearly legible.
55 1) Submittals including illegible hard copy sheets will be rejected in their entirety and
56 returned for resubmittal without review.

57 B. Shop Drawings:

- 58 1. The Owner reserves the right to make changes to descriptive information, component selection and
59 nomenclature during shop drawing review without incurring and additional cost.

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2. Note that for satisfying submittal requirements for Division 27, "Product Data" is usually more appropriate than true "Shop Drawings" as defined in Division 01. However, the term "Shop Drawings" is generally used throughout specification.
 3. Submit shop drawings or product data as soon as practicable after signing contracts. Submittals must be approved before materials are ordered, delivered to site, or installed.
 4. Documents submitted in printed hard copy form shall be original catalog sheets or sheets printed from manufacturer-issued electronic .pdf files and shall be clearly legible.
 5. Group submittals by Section to include complete documentation of related systems, products and accessories.
 6. Provide a table of contents for each submittal, to include each item being submitted. Each table of contents entry shall include:
 - a. Nomenclature applied in the specifications and/or on the drawings to describe the item (e.g., "Category 6 Cable")
 - b. Manufacturer and part number, where applicable
 - c. Reference to Specification Section or drawing where item is specified (e.g., "270000 - 1.9 - A - 4 - c - 1" or "Drawing T000")
 7. Submittals shall be prepared to include information required to demonstrate compliance with requirements of the contract documents.
 - a. Where submitted information does not demonstrate compliance with requirements of the contract documents, discrepancies shall be so noted and an explanation for the discrepancy shall be provided.
 8. Where manufacturer's product data sheets include multiple part numbers, mark the sheets to indicate specific items being submitted.
 - a. Markings shall be reproducible (arrow, boxed, encircled, checkmark, etc.).
 - b. Where product data includes multiple product options, mark proposed option(s).
 9. Mark manufacturer's product data sheets with nomenclature applied in the specifications and/or on the drawings to describe the item (e.g., "Category 6 Cable")
 10. When manufacturer's reference numbers are different from those specified, provide correct cross-reference number for each item and explanation for the discrepancy.
 11. Where applicable, dimensions shall be marked in units to match those specified.
 12. Provide documentation demonstrating compliance with requirements specified in 270000 - 1.9 - Quality Assurance above.
 13. Provide manufacturer's product data for each item, component, device, and material proposed for the system. At a minimum, the data submitted shall clearly demonstrate compliance with each requirement specified in the contract documents.
 - a. Include wiring diagrams for electrically powered or controlled equipment.
 - b. When equipment and items specified include accessories, parts and additional items under one designation, submittals shall be complete and include required components.
 - c. Where submittals cover products containing potentially hazardous non-metallic materials, include "Material Safety Data Sheet" (MSDS) from manufacturer stating physical and chemical properties of components and precautionary considerations required.
 - d. Where obtaining a proposed item, component, device, or material involves a lead time of more than ten (10) working days, Contractor shall note the lead time quoted by the distributor, supplier, or vendor and provide an explanation of factors contributing to the lead time.
 14. Provide one (1) \geq 3-foot section of each wire and cable proposed for each system.
 - a. The entirety of the manufacturer's markings printed on the cable as part of the normal manufacturing process shall be visible and legible on the section provided.
 - b. Label the section provided, indicating the specified use the wire or cable is being proposed for.
 15. Provide a CAD-generated project-specific system block diagram that clearly depicts system components and wiring, including proposed size of each conductor, and clearly illustrates the location of major system components, system topology, and interconnections between system components.
 - a. Where system includes multiple instances of an identical component or device in an identical configuration, diagram may depict a single, typical instance of that component or device labeled as typical, so long as doing so does not negatively impact the diagram's ability to effectively convey pertinent system information in a complete manner. Architect/Engineer will make final determination on whether a "typical" depiction is acceptable.
 - b. Diagrams shall be Contractor-generated. Submitting copies of bid or construction documents is not an acceptable means of fulfilling this requirement.
 16. Provide a CAD-generated project-specific equipment room layout for each equipment room. Layouts shall be drawn to scale and depict equipment, raceways, accessories, and working clearances.

- 1 a. Diagrams shall be Contractor-generated. Submitting copies of bid or construction documents
2 is not an acceptable means of fulfilling this requirement.
3 Provide CAD-generated, project-specific installation details for system components.
4 Provide documentation of system power supply, battery charger, and battery calculations.
5 19. Provide documentation of proposed labeling scheme, to include:
6 a. Logic of alphanumeric identifiers for each component type
7 b. Proposed font/type face
8 c. Samples of each proposed label type (e.g., cable wrap, faceplate, patch panel, etc.)
9 1) Samples shall be actual labeling products typical of those proposed for use on the
10 project, including proposed font type, size, and print quality.
11 2) Affix each submitted proposed label type to a sheet of backing paper. Backing paper
12 color shall provide contrast with the proposed labels to aid in making physical outline
13 of labels clear on scanned electronic copies, and include identification of specific use
14 each label type is proposed for (e.g., cable wrap, faceplate, patch panel, etc.).
15 20. Provide documentation of proposed testing procedures, to include:
16 a. List of applicable codes, standards, and/or guidelines referenced to develop testing procedure
17 b. Equipment proposed for use in testing, to include:
18 1) Manufacturer's product data for each unit
19 2) Documentation demonstrating date of most recent calibration for each unit
20 3) Step-by-step procedure for configuring unit to perform proposed tests
21 4) Documentation demonstrating that workers are trained and certified on each unit
22 c. Step-by-step description of proposed testing procedures
23 d. Samples of each proposed test result documentation format. At a minimum, test result
24 documentation shall include:
25 1) Date of test(s)
26 2) Name(s) of worker(s) conducting the test(s)
27 3) Test equipment type, manufacturer, model number, and serial number
28 4) Test equipment calibration reference and test setup
29 5) Test equipment configuration (e.g., frequencies tested, wavelengths tested, etc.)
30 6) Description of sub-system tested
31 7) Unique alphanumeric identifier assigned to cable, device, etc. under test
32 8) Equipment location and direction of test, where applicable
33 9) Test result data
34 21. Provide documentation of proposed training curriculum, to include:
35 a. Detailed agenda for each training session
36 b. Example support and reference materials for each training session
37 c. Documentation demonstrating that proposed instructor is qualified to provide the proposed
38 training and has relevant experience providing the proposed training.
39 22. Contractor shall review prepared shop drawings internally for compliance with requirements of the
40 project documents and make any alterations necessary to ensure compliance. Contractor shall
41 stamp the cover page of each shop drawing section submitted to certify that this internal review was
42 completed and necessary alterations were made to ensure compliance with requirements of the
43 project documents prior to submitting the shop drawings for review.
44 23. Submittals which are not complete, not permanent, or not properly checked by Contractor, will be
45 returned without review.
46 24. Engineer's Review is to confirm compliance with performance, interoperability, physical, and other
47 pertinent requirements of project. Review is not to confirm quantities nor that required items have
48 been submitted.
49 25. "Coordination Drawings", which are normally prepared by Contractor to coordinate work among
50 various trades and to facilitate installation, shall not be submitted for Division 27 work unless
51 specifically requested in technical sections. These types of drawings typically include dimensioned
52 piping, ductwork, communications and/or electrical raceway layouts.
53 a. Unless specifically requested in Division 27 technical sections, submittals of coordination
54 drawings will be returned without review.
55 26. Work on site shall not proceed prior to approval of shop drawings related to that work.
56 C. Certificates and Inspections:
57 1. Deliver certificates approving installations to Owner unless otherwise directed.
58 D. Operation and Maintenance Manuals:
59 1. Refer to individual technical sections for additional information and requirements.
60 2. Upon completion of work but before final acceptance of system, submit to Architect for approval, one
61 (1) printed copy of operation and maintenance manuals in loose-leaf binders and one (1) electronic
62 copy of operation and maintenance manuals in .pdf format. If "one copy" is larger than 2" thick or

- 1 consists of multiple volumes, submit only one set initially for review. After securing approval, submit
2 quantity of printed and electronic copies of final operation and maintenance manuals to Owner per
3 Division 01.
- 4 3. Manuals shall be organized in the same manner as Shop Drawings as specified above and shall
5 have tabs for each system, sub-system, and piece of equipment.
- 6 4. At a minimum, manuals shall include the following:
- 7 a. Copies of approved shop drawings, including A/E review and approval forms.
- 8 b. Final manufacturer's product data for each item, component, device, and material that
9 constitutes the installed system, incorporating any deviations from approved manufacturer's
10 product data submittal and reference to project documentation that initiated the deviation.
- 11 c. Manufacturer's owner's manuals and operating and maintenance instructions:
- 12 1) Include parts lists of items or equipment. Where manufacturer's data includes several
13 types or models, applicable type or model shall be designated.
- 14 2) Exploded parts lists where available
- 15 d. Documentation that ownership of software and programming has been transferred to Owner.
- 16 e. Documentation of applicable product-related licenses, including documentation that licenses
17 have been transferred to Owner.
- 18 f. Documentation of manufacturer's warranties.
- 19 g. Contact information for manufacturers, local suppliers/distributors, and service companies:
- 20 1) Name of primary contact
- 21 2) Street address
- 22 3) Mailing address
- 23 4) Voice phone number
- 24 5) Fax phone number
- 25 6) Internet/web page address
- 26 h. Factory and field test result documentation, in format of approved test result documentation
27 submittal.
- 28 1) Test results shall be submitted in .pdf electronic format and in native file format of test
29 equipment, where applicable.
- 30 a) Where equipment-specific software is required to inspect test result files
31 provided in native file format of test equipment, Contractor shall provide at no
32 additional cost one (1) full version of equipment-specific software required to
33 open and inspect test result files.
- 34 i. Training materials.
- 35 j. Additional information, diagrams or explanations as designated under respective equipment
36 or systems specification section
- 37 5. O&M manuals and instructions to Owner shall be provided prior to request for final payment.
- 38 6. O&M materials shall become the property of the Owner.
- 39 E. Record Drawings:
- 40 1. Provide final CAD-generated project-specific system block diagram, incorporating any deviations
41 from approved system block diagram submittal and reference to project documentation that initiated
42 the deviation. Diagram shall include unique alphanumeric identifiers for each item as so labeled.
- 43 2. Provide CAD-generated record drawings clearly documenting actual final locations of major system
44 cabling routes and system devices, system equipment, system topology, and interconnections
45 between system components, and unique alphanumeric identifiers for each item as so labeled.
- 46 3. Coordinate with Architect for designated set of contract documents to be used as a basis for record
47 drawings.
- 48 4. Record Drawing materials shall become the property of the Owner.
- 49 F. Review and approval of submitted documents does not relieve Contractor of contractual obligations, alter
50 work specified in the contract documents, alter requirements of the contract documents, or void requirements
51 of the contract documents.
- 52 **1.11 WARRANTY**
- 53 A. Refer to Division 01 for general Warranty requirements.
- 54 B. Refer to technical sections for Warranty requirements specific to the work under that section. Unless
55 specified otherwise in Division 01 or in a technical section:
- 56 1. The warranty period shall commence on the date of final acceptance by Owner and extend for a
57 minimum of one (1) year.
- 58 a. Where manufacturer offers a standard warranty that extends beyond one (1) year, the
59 published duration of the manufacturer warranty shall govern for material covered by that
60 warranty.

- 1 2. The warranty shall guarantee work performed and materials, devices, equipment, etc. provided to be
2 free from defect or malfunction.
3 C. Manufacturer's guarantee and/or warranties shall extend to the Owner.
4 D. Contractor shall, at Owner's sole option, repair, replace, or correct defective material and workmanship and
5 material and workmanship that does not conform to the contract documents, at no extra cost to Owner.
6 Contractor shall also bear costs to correct damage resulting from defective or nonconforming materials
7 and/or workmanship.
8 E. Warranty does not cover defect or malfunction that is solely the result of normal wear, improper maintenance,
9 or improper operation, as determined by the Architect/Engineer.
10 F. Where Contractor disturbs any work warranted under another contract while fulfilling requirements of any
11 warranty, Contractor shall restore such disturbed work to condition satisfactory to Architect/Engineer and
12 Owner and shall warrant such restored work to same extent as it was warranted under such other contract.
13 G. Warranty shall include labor, material, and travel time.

14 **PART 2 - PRODUCTS**

15 **2.1 GENERAL**

- 16 A. Provide new materials, unless specifically noted otherwise in the contract documents.
17 B. Where manufacturer has replaced a part number with a newer part number, provide the version of the
18 material that is the manufacturer's most current offering available at the time of installation.
19 C. Where multiple manufacturers' names or manufacturers' names and part numbers are listed, the basis of
20 design listed is to be considered the benchmark for quality, features, and functionality for that material.
21 D. Include hardware, details, options, modules, accessories, subassemblies, etc. not shown or specified, but
22 necessary for proper installation and operation.
23 E. Where \geq one (1) of the same item of material is required, all such units shall be provided as the same
24 manufacturer and part number.
25 F. Refer to technical sections for additional information and requirements.

26 **2.2 LISTING**

- 27 A. Materials shall bear UL label or listing, unless UL label or listing is not available for that type of material.
28 Where a nationally recognized testing laboratory has an applicable system listing and label, the entire
29 system shall be so listed and labeled.
30 2.3 Other nationally recognized testing agencies acceptable to the AHJ are approved.
31 A. Cables shall be Underwriters Laboratory (UL) listed, comply with Article 800 (Communications Circuits) of
32 National Electrical Code and shall meet specifications of NEMA (low loss), UL 444, and ICEA (where
33 applicable).
34 B. Refer to technical sections of this Division of work for listing requirements.

35 **2.4 PRODUCT SUBSTITUTIONS**

- 36 A. Refer to Division 01.
37 B. Unless noted otherwise, Contractor may choose to propose equivalent material from another manufacturer.
38 Where Contractor chooses to propose other material they believe to be equivalent, Contractor is solely
39 responsible for ensuring that the alternate material is demonstrably equivalent to the listed basis of design,
40 meets requirements specified in the project documents for that material, and fits in the allocated space.
41 Contractor shall submit alternate material for approval in accordance with requirements of Division 01 and
42 of this Section, and Architect/Engineer shall make the final determination as to whether the proposed
43 alternate material is equivalent and acceptable for use on the project.

44 **PART 3 - EXECUTION**

45 **3.1 GENERAL**

- 46 A. Execute work to minimize interference, annoyance, or inconvenience such work might impose on Owner or
47 other contractors.
48 B. All work shall be performed in "neat and workmanlike" manner as defined in ANSI/NECA 1 "Standard
49 Practices for Good Workmanship in Electrical Contracting".
50 C. Include incidental items and details that are not depicted on the drawings, required in the specifications, or
51 specified in other contract documents but are necessary for proper installation, operation, and satisfying the
52 scope of work and design intent conveyed.

- 1 **3.2 WORK SEQUENCE**
- 2 A. Coordinate schedule for execution of work performed under this section with Owner, Construction Manager,
3 General Contractor, and other trades.
- 4 B. Disruption of Normal Operations
- 5 1. Contractor shall identify work that may disrupt Owner's normal operations or otherwise interfere with
6 Owner's use of the premises, and coordinate with Owner, Architect, and other contractors to
7 determine which of the identified project work will disrupt operations or interfere with use of the
8 premises. Owner shall have right of final determination on which identified project work will disrupt
9 operations or interfere with use of the premises. Contractor shall coordinate with Owner to develop
10 and finalize action plans to minimize and mitigate disruption of operations and interference with use
11 of the premises.
- 12 a. Action plans may include scheduling identified work to be executed on days and during hours
13 outside Owner's normal days and hours of operation or on a schedule that minimizes
14 disruption to Owner's normal operations, as defined by the Owner.
- 15 2. Contractor shall complete work sequence coordination and obtain approval of action plan and
16 schedule by Owner, Architect, and other contractors prior to the commencement of work on site.
- 17 3. Contractor shall include in their bid costs to perform disruptive and interfering work outside standard
18 business days and hours.
- 19 **3.3 BUILDING ACCESS:**
- 20 A. Arrange for necessary openings in building to allow for admittance of apparatus.
- 21 **3.4 DAMAGE**
- 22 A. Contractor shall report to the Architect/Engineer existing damage or deleterious conditions found by the
23 Contractor on site prior to Contractor's commencement of work on site, including damage to structure, floors,
24 walls, ceilings, doors, windows, furnishings, equipment, etc. Contractor shall be solely responsible for costs
25 to correct damage or deleterious conditions found in the project area that went unreported prior to the
26 Contractor's commencement of work on site.
- 27 B. Contractor shall replace accessible ceiling tiles damaged during the execution of work under this section.
28 Replacement tiles provided shall match manufacturer, part number, size, style, color, texture, etc. of
29 damaged tiles.
- 30 **3.5 DELIVERY, STORAGE, AND HANDLING**
- 31 A. Refer to Division 01 for additional information and requirements.
- 32 B. Transport and handle materials in a manner that avoids damage, preserves their original condition as
33 delivered from the manufacturer, is consistent with manufacturer's guidelines and instructions, and maintains
34 applicable manufacturer warranties.
- 35 1. Where applicable, lift only with lugs provided for the purpose.
- 36 C. Maintain manufacturer's original material packaging and shipping packaging until material is installed.
- 37 D. Store materials in a clean, dry, secure, temperature-controlled location in a manner that preserves their
38 original condition as delivered from the manufacturer, is consistent with manufacturer's guidelines and
39 instructions, and maintains applicable manufacturer warranties. Protect stored material from deleterious
40 substances, agents, conditions, etc. including, but not limited to, dust, dirt, debris, moisture, chemicals,
41 chemical compounds, corrosion, temperatures outside material's published tolerance range, etc. and from
42 damage due to intentional or incidental contact, vandalism, neglect, etc.
- 43 E. Contractor shall include in their bid costs to deliver, store, and handle materials.
- 44 **3.6 LOCATIONS OF WORK**
- 45 A. Field-verify locations, elevations, measurements, etc. prior to installation of materials.
- 46 B. Telecommunications outlet and device locations shown on drawings are diagrammatic and shall not be used
47 for dimensioning of final location. Field-coordinate locations, elevations, measurements, etc. with Owner
48 and with other trades prior to installation of materials.
- 49 1. Where architectural features govern location of work, refer to Architectural contract documents.
50 Where work by other trades governs location of work, refer to the contract documents of the other
51 trade. Check, verify, and coordinate work with other trades' contract documents and include
52 modifications, relocations, adjustments, etc. necessary to complete work and prevent interference
53 with other trades.
- 54 2. Included in this contract are connections to equipment provided by others. Refer to other trades'
55 contract documents, including Architectural, Electrical, Integrated Automation, Mechanical, and
56 Technology, and to final shop drawings for equipment being furnished under other sections for exact
57 locations of outlets, devices, equipment, etc. and of various connections required.

- 1 C. Locate devices, equipment, etc. to fit details, panels, decorating, finish, etc. at space. Owner and Architect
2 reserve right to make minor position changes of device, equipment, etc. locations before work has been
3 installed.
- 4 D. Contractor shall survey the site and include in their bid costs to perform work as specified in the contract
5 documents.
- 6 E. Where conditions on site require adjustments to indicated locations and/or arrangements of devices,
7 equipment, etc., Contractor shall make required changes at no additional cost to the Owner.
- 8 **3.7 CONCRETE WORK:**
- 9 A. Provide cast-in-place concrete as required by contract documents unless otherwise noted.
- 10 B. Concrete shall comply with Division 03 - Concrete.
- 11 C. Provide anchor bolts, metal shapes and templates required to be cast in concrete or used to form concrete
12 for support of equipment.
- 13 **3.8 CUTTING AND PATCHING:**
- 14 A. Refer to General Conditions of Contract and Division 01 for additional information and requirements.
- 15 B. Perform cutting and patching required for complete installation of systems, unless otherwise noted. Patch
16 and restore damaged work to original condition, including openings remaining from removal or relocation of
17 existing system components.
- 18 C. Repair damage to walls, floors, ceilings, fixtures, furnishings, etc. caused by installation of work under this
19 section. Repairs must match preexisting condition, color, finish, etc. of walls, floors, ceilings, fixtures,
20 furnishings, etc.
- 21 D. Provide materials required for patching and repair, unless otherwise noted.
- 22 E. Do not pierce beams or columns without permission of Architect and then only as directed. If openings are
23 required through walls or floors where no sleeve has been provided, hole shall be core drilled to avoid
24 unnecessary damage and structural weakening.
- 25 F. Where alterations disturb lawns, paving, walks, etc., replace, repair or refinish surfaces to condition existing
26 prior to commencement of work. This may include areas beyond construction limits.
- 27 **3.9 FLOOR, WALL, ROOF, AND CEILING OPENINGS**
- 28 A. Coordinate location of openings, chases, furred spaces, etc. with appropriate Contractors.
- 29 B. Size and location of openings, chases, holes, etc. shall be reviewed and approved by Structural Engineer
30 prior to execution.
- 31 C. X-ray reinforced concrete floors to identify actual locations of embedded reinforcing elements prior to making
32 openings, chases, holes, etc. and adjust size and location of openings, chases, holes, etc. to avoid
33 embedded reinforcing elements.
- 34 D. Openings for penetrations shall be $\geq 1/2"$ larger on all sides than the outside dimensions of the raceways,
35 and shall have $\geq 50\text{mm}(2")$ clearance around the openings. Where fire resistant penetrations are required,
36 size openings in accordance with published UL assembly being installed and with firestopping system
37 manufacturer's published recommendations.
- 38 E. Provide sleeves, inserts, etc. that are to be built into structure in a timely manner during progress of
39 construction to prevent delay of work.
- 40 F. Temporary sleeves, if used to form wall openings, shall be removed prior to installation of permanent
41 materials. Permanent sleeves for wall penetrations shall be minimum 24 ga galvanized sheet metal unless
42 otherwise noted.
- 43 G. Steel sleeves, when required, shall be Schedule 40 carbon steel pipe with integral water stop.
- 44 H. Circular openings, chases, holes, etc. through finished concrete or masonry shall be made by core drilling.
45 Rectangular or square openings, chases, holes, etc. through finished concrete or masonry shall be made
46 by concrete saw. Impact hammer, manual chisel, etc. shall not be used.
- 47 I. Where penetrations of fire-rated assemblies are involved, seal penetrations with appropriate firestopping
48 systems as specified in Division 26.
- 49 J. Seal non fire-rated floor penetrations with non-shrink grout equal to Embeco by Master Builders, or urethane
50 caulk, as appropriate.
- 51 K. Seal non-rated wall openings with urethane caulk.
- 52 L. Adhesives and sealants used on the interior of the building shall comply with VOC limits per Division 01
53 LEED requirements.
- 54 M. Finish and trim penetrations as shown on details and as specified hereinafter.
- 55 N. Provide escutcheons where raceways pass through walls, floors or ceilings and are exposed in finished
56 areas. Size escutcheons to fit raceways for finished appearance. Finished areas shall not include
57 mechanical/electrical rooms, janitor's closets, storage rooms, etc., unless suspended ceilings are specified.

- 1 1. Coordinate color and finish of escutcheons with Architect. Escutcheons shall be chrome or nickel
2 plated unless otherwise directed.
- 3 O. Wherever installation of this Contractor's equipment destroys sound transmission class (STC) rating integrity
4 of wall, floor, or ceiling, this Contractor shall bear the cost of repair to restore that integrity. Coordinate these
5 requirements with General Contractor.
- 6 P. Submit product data and installation details for penetrations of building structure. Submittal shall include
7 schedule indicating penetrating materials, (including steel conduit, PVC conduit, cables, cable tray), sizes of
8 each, opening sizes and sealant products intended for use.
- 9 Q. Submit complete penetration layout drawings showing openings in building structural members including
10 floor slabs, bearing walls, shear walls. Indicate and locate, by dimension, required openings including those
11 sleeved, formed or core drilled. Drawings shall be approved by the structural engineer prior to preparing
12 openings in structural member.

13 **3.10 EQUIPMENT ACCESS**

- 14 A. Install raceways, junction and pull boxes, and accessories to permit access to equipment for maintenance
15 after completion of project. Contractor shall relocate raceways or accessories as required to provide access
16 at no additional cost to Owner.
- 17 B. Install equipment with ample space allowed for removal, repair or changes to equipment. Provide ready
18 accessibility to equipment and wiring without moving other equipment, which is to be installed or which is
19 already in place.
- 20 C. Verify room door swings before installing telecommunications outlets, devices, etc. and install boxes on latch
21 side of door unless otherwise noted.
- 22 D. Access doors in walls, chases, or inaccessible ceilings will be provided under Division 08 - Access Doors
23 and Frames, unless otherwise indicated. Access doors shall be for purpose of providing access where
24 equipment requiring servicing, repairs, or maintenance is located in walls or chases or above inaccessible
25 ceilings.
- 26 1. Provide necessary coordination and information to Trade Contractor under Division 08 - Access
27 Doors and Frames. This information shall include required locations, minimum sizes, and rough-in
28 dimensions, without limitations.

29 **3.11 EQUIPMENT SUPPORTS**

- 30 A. Provide supporting steel not indicated on drawings as required for installation of equipment and materials
31 including angles, channels, beams, hangers.
- 32 B. Concrete anchors, used for attachment to concrete, shall be steel shell with plug type. Plastic, rawhide or
33 anchors utilizing lead are not allowed.
- 34 C. Do not support equipment or cable pathways from metal roof decking.

35 **3.12 SUPPORT PROTECTION**

- 36 A. In occupied areas, electrical rooms, mechanical rooms, utility areas, and areas requiring normal
37 maintenance access, certain equipment must be guarded to protect personnel from injury.
- 38 B. Provide minimum 1/2" thick Armstrong Armaflex insulation or similar product applied with Armstrong 520
39 adhesive on lower edges of equipment, including bus duct, cable tray, pull boxes and electrical supporting
40 devices suspended less than 7 ft above floors, platforms or catwalks in these areas.
- 41 C. Threaded rod or bolts shall not extend beyond supporting element and shall be protected as described
42 above.

43 **3.13 INSTALLATION**

- 44 A. General
- 45 1. Refer to manufacturer's product installation instructions, recommendations, and guidelines for
46 additional information and requirements. Wherever a discrepancy is identified between Contract
47 Documents and manufacturer's product installation instructions, the more stringent requirement shall
48 govern.
- 49 2. Cable, devices, equipment, etc. shall not be installed until building is enclosed and weather tight, and
50 temperature and humidity conditions are controlled continuously at levels approximately equivalent
51 to final conditions expected after occupancy.
- 52 3. Cable, devices, equipment, etc. shall not be installed in areas where installed materials would be
53 exposed to moisture, dust, overspray, or other deleterious conditions.
- 54 4. No equipment, devices, cable, etc. shall be installed in Communications Equipment Rooms until
55 room is broom clean and free of debris, dirt, dust, moisture, foreign materials, etc. and room is
56 equipped with operable door that can be closed and latched to prevent ingress of deleterious
57 conditions.

- 1 5. Protect installed cable, devices, equipment, etc. from damage through completion of construction
2 and date of Owner's final acceptance.
- 3 B. Rough-In
- 4 1. Coordinate back box, plaster ring, raceway, surface raceway, etc. pathway requirements with
5 Division 26 prior to the commencement of work on site.
- 6 2. Where Division 27 device or equipment is provided with a device- or equipment-specific back box,
7 Contractor shall provide that back box to Division 26 prior to commencement of rough-in work on
8 site.
- 9 C. Cable and Conductors
- 10 1. No cable or conductor shall be fished bare through the interior of any enclosed, inaccessible ceiling,
11 wall, or floor structures. Where such installation is required, fish flexible metallic conduit through the
12 structure, secure the flexible metallic conduit at both ends and provide protective bushings at both
13 ends of it, and install cable inside flexible metallic conduit.
- 14 2. Install cabling in pathways provided, or as designated on floor plans, and support from building
15 structure.
 - 16 a. Where installed in free-air, support cables using J-hook type cable supports. Refer to Section
17 27 0528.29 - Hangers and Supports for Communications Systems for installation
18 requirements.
 - 19 1) J-hook capacities shall be per manufacturer's recommendations and shall consider
20 diameter of cable type(s) being installed.
 - 21 2) Route cable/hooks at right angles, parallel to construction.
 - 22 b. Where installed in Cable Tray, lay cables neatly in tray.
 - 23 1) Do not tie.
 - 24 2) Provide sufficient slack in cables to allow for unequal expansion coefficients of cable
25 tray and cables. This requirement is in addition to slack required at cable tray
26 expansion joints.
- 27 3. Cable and conductors installed shall be free of defects and damage. Provide required installation
28 tools to facilitate cable and conductor installation without damaging the cable and protect cable and
29 conductors from damage. Visually inspect cable during installation for damage or defects, including
30 cuts, blisters, abrasions, etc. Provide permanent abrasion protection at points where cable or
31 conductors contact surface that could damage the cable or conductors.
- 32 4. Pull cable by hand unless installation conditions require mechanical assistance.
- 33 5. Do not exceed recommended pulling tensions or bending radii during cable installation.
 - 34 a. Where mechanical assistance is used, ensure that maximum tensile load for cable is not
35 exceeded.
 - 36 1) This may be in form of continuous monitoring of pulling tension, use of "break-away"
37 fitting, or other approved method.
 - 38 b. Replace cables bent or kinked to radius less than recommended dimension.
 - 39 1) This shall be at no expense to Owner.
- 40 6. Pulling lubricant may be used and shall:
 - 41 a. Be non-injurious to cable jacket and other materials used.
 - 42 b. Not harden or become adhesive with age.
- 43 7. Provide an adequate number of workers during cable and conductor pulling operations to observe
44 cable or conductors at points of entry in to and exit from pathways, to feed cable and conductors,
45 and to operate pulling machinery.
- 46 8. Provide pull cord (200 lb minimum) with cable installed in conduit or innerduct.
- 47 9. Cable and conductors shall be installed continuous and splice-free.
- 48 10. Installed cable and conductors shall be free of tension.
 - 49 a. In cases where cable must bear stress, provide Kellems-type grips to spread stress over
50 longer length of cable.
- 51 11. Maintain manufacturer's published minimum bend radius on installed cable and conductors. Provide
52 permanent bend radius protection at points where cable and conductors change direction.
- 53 12. Cable and conductors shall be installed parallel and perpendicular to major building lines.
- 54 13. Cable and conductors shall be kept clear of and protected from work by other trades.
- 55 14. No cable or conductor shall be attached to or supported in any manner by work by other trades.
- 56 15. No cable or conductor shall be laid on accessible ceiling grid or tiles, or attached or supported in any
57 manner by accessible ceiling tiles, grid, or support wires.
- 58 16. In vertical pathway, support cables on each floor using industry recognized support methods
59 designed specifically for that purpose.
 - 60 a. Strap vertical runs as required, to prevent sagging of cables.
- 61 17. Route and support cable in Communications Equipment Rooms utilizing horizontal overhead cable
62 runway, wall-mounted vertical cable runway, and wall-mounted "D-type" mounting rings.

- 1 18. Neatly lace, dress, and support cabling and conductors.
2 19. To reduce effects of EMI, adhere to the following minimum cable separation distances:
3 a. 5" from power lines of 2 kVA
4 b. 18" from high voltage lighting (including fluorescent and LED)
5 1) When using LED lighting, stated separation distance shall be from cables to LED
6 drivers.
7 c. 39" from power lines of 5 kVA or greater
8 d. 47" from transformers and motors
9 D. Termination
10 1. Install and tighten connectors per manufacturer's instructions, using the appropriate tools
11 recommended by the manufacturer for that purpose. Do not strip or damage connectors, terminals,
12 or equipment by over-tightening terminations.
13 2. Cable and conductor color coding shall be maintained consistent throughout the installation for each
14 telecommunications outlet, device, and equipment type.
15 3. Provide a minimum of 12 inches of slack at each system device for future retermination.
16 E. Equipment
17 1. Unless noted otherwise, install wall mounted equipment in Communication Equipment Rooms
18 between +18" AFF and +72" AFF.
19 F. Configuration and Programming
20 1. Coordinate configuration and programming with Owner prior to the commencement of configuration
21 and programming work.
22 2. Prior to substantial completion, change system hardware and software passwords from manufacturer
23 default passwords to Owner-defined passwords. Coordinate new passwords with Owner prior to
24 commencement of programming work.
- 25 **3.14 PAINTING:**
26 A. Furnish equipment with factory applied prime finish unless otherwise specified.
27 B. If factory finish on equipment furnished by Contractor is damaged in shipment or during construction, refinish
28 equipment per manufacturer's instructions and guidelines to satisfaction of Owner and Engineer.
29 C. Furnish one can of touch up paint for each factory finish, which will be final finished surface of product.
- 30 **3.15 UTILITY SERVICES**
31 A. Coordinate with Owner and telecommunication service providers to interface with service raceways entering
32 site and extending to point of presence.
- 33 **3.16 CABLE AND CONDUCTOR PROTECTION**
34 A. Protect cables, conductors, and termination components from contact with, and potential application of,
35 foreign materials.
36 1. Foreign material is defined as material that is not part of cabling assembly, conductor, and termination
37 components when delivered from manufacturer.
38 2. Examples include paint overspray and drywall compound.
39 B. Cables, conductors, and components that come into contact with foreign materials shall be replaced at no
40 cost to project.
41 1. Solvents and other cleaning agents shall not be used to remove foreign materials that have already
42 accumulated on cables, conductors, and components.
- 43 **3.17 TESTING**
44 A. General
45 1. Submit documentation of proposed testing procedures with shop drawings. Testing shall not proceed
46 without approval by the Architect/Engineer. Failure to submit documentation of proposed testing
47 procedures shall be grounds for Architect/Engineer or Owner to reject documentation of related
48 testing and to require repeat of affected test at no additional cost to Owner. Documentation shall
49 include:
50 a. Description of each test
51 b. Required test equipment for each test
52 c. Pass/fail criteria for each test
53 d. Sample test result forms
54 e. Proposed test documentation file naming format
55 2. Owner and/or Architect/Engineer may, at their option, be in attendance to witness testing. Submit
56 proposed schedule for acceptance testing to Owner and Engineer \geq ten (10) working days in advance
57 to allow for their participation.

- 1 3. Conduct tests during course of construction when identifiable portion(s) of installation is complete.
- 2 a. Alternatively, testing may be conducted after entire installation is complete if this does not
- 3 delay project schedule.
- 4 4. Provide equipment and personnel to conduct acceptance tests.
- 5 5. Work shall be 100% fault free, unless otherwise noted. Where cable, devices, equipment, or systems
- 6 fail to meet required performance on test criteria under test, replace or repair defective work and/or
- 7 materials at no additional cost to Owner and repeat inspection and test. Replacement materials shall
- 8 be new.
- 9 6. Testing shall be completed and test results accepted by Owner and Architect/Engineer before Owner
- 10 and last equipment and cross connects are installed.
- 11 B. Testing Cable
- 12 1. Test installed cable in accordance with applicable standards and cable manufacturer's and
- 13 equipment manufacturer's published requirements, guidelines, and best practices.
- 14 2. At a minimum, testing of installed cable shall include:
- 15 a. Test for opens on each conductor
- 16 b. Test for conductor-to conductor shorts, among all conductors
- 17 c. Test for conductor to ground shorts, for each conductor (where applicable)
- 18 3. Refer to Section 27 1000 for additional information on and requirements for testing structured cabling.
- 19 C. Testing Devices
- 20 1. Testing conducted shall verify proper operation of each feature and function of each device.
- 21 2. Testing conducted shall verify that each device has been configured and programmed in accordance
- 22 with requirements of the project documents and Owner's direction.
- 23 D. Test Documentation
- 24 1. This Contractor is responsible for certifying, in writing, equipment and system test results.
- 25 Certification shall include, but may not be limited to:
- 26 a. Date and time of test
- 27 b. Name(s) and title(s) of personnel conducting test
- 28 c. Identification of device or portion of system under test
- 29 d. Test equipment used
- 30 e. Pass/fail criteria
- 31 f. Results of test
- 32 g. Signature of personnel who conducted the test
- 33 2. Maintain copies of certified test results, including those for failed tests, at project site. At completion
- 34 of project, include copies of test records and certifications in O&M Manuals.
- 35 3.18 **START-UP**
- 36 A. Systems and equipment shall be started, tested, adjusted, etc. and turned over to Owner ready for operation.
- 37 1. This includes "Owner-Furnished, Contractor-Installed" (OFICI) and "Contractor-Furnished,
- 38 Contractor-Installed" (CFICI) systems and equipment.
- 39 B. Contractor shall provide services of technician/installer knowledgeable in start-up and checkout of types of
- 40 systems and equipment on project.
- 41 C. Provide start-up services, by manufacturer's representative where specified or where Contractor does not
- 42 have qualified personnel.
- 43 D. Follow manufacturer's pre-start-up checkout, start-up, trouble shooting and adjustment procedures.
- 44 E. Coordinate start-up with trades.
- 45 3.19 **ATTIC STOCK**
- 46 A. Within ten (10) business days of the date of substantial completion, Contractor shall deliver to the Owner at
- 47 the project site spare devices and equipment specified in technical sections to be provided as Owner's attic
- 48 stock.
- 49 B. Refer to technical sections for attic stock device and equipment type and quantity requirements.
- 50 3.20 **DOCUMENTATION**
- 51 A. Refer to Division 01 for additional information and requirements.
- 52 B. Refer to technical sections for additional information and requirements.
- 53 C. Refer to 270000 - 1.10 - Submittals for additional information and requirements.
- 54 D. Upon completion of installation, Contractor shall provide System Documentation. Documentation shall
- 55 include:
- 56 1. All Approved Submittals
- 57 2. Acceptance Test Results
- 58 3. Manufacturer's Warranty Documents

- 1 4. Record Drawings
2 E. Within five (5) working days of completion of each testing phase (e.g., building, area, floor, section,
3 subsystem, cable type, etc.), Contractor shall submit draft record drawings and draft test result
4 documentation for that testing phase.
5 1. Contractor shall schedule and coordinate testing phases to be complete \geq fifteen (15) working days
6 prior to scheduled occupancy of phase area, such that the Architect/Engineer and Owner have \geq ten
7 (10) working days to review draft test results and the Owner has \geq ten (10) working days to prepare
8 the phase area for occupancy.
9 a. Engineer or Owner may request that 10% random re-test be conducted on cable system to
10 verify documented findings. Tests shall be a repeat of those defined above and in technical
11 sections.
12 1) This re-test shall be at no additional cost to Owner.
13 2) Owner may also perform independent testing to verify results.
14 a) If findings contradict documentation submitted by Contractor, additional testing
15 can be requested to extent determined necessary by Engineer or Owner,
16 including 100% re-test.
17 2. Draft record drawings may include legible hand-written markings of actual device locations and
18 unique alphanumeric identifiers as so labeled.
19 F. Submit final versions of Operations and Maintenance Manuals and Record Drawings within thirty (30)
20 calendar days of completion of last testing phase (e.g., building, area, floor, section, subsystem, cable type,
21 etc.).

22 **3.21 CLEANING**

- 23 A. Refer to Division 01 for additional information and requirements.
24 B. Refer to individual technical sections for additional information and requirements specific to work under that
25 section.
26 C. Contractor shall, periodically, throughout execution of work under this section and/or as directed by
27 Architect/Engineer, Owner, Construction Manager, or General Contractor, remove waste materials, trash,
28 rubbish, debris, etc. generated by execution of work under this section from building and leave work areas
29 broom clean.
30 1. Construction waste shall be managed in accordance with provisions of Section 01524 Construction
31 Waste Management.
32 D. After installation is complete and prior to Owner's final acceptance, Contractor shall clean work provided
33 under this section.
34 1. Remove unused materials, tools, installation equipment, etc. from the site.
35 2. Faceplates, devices, components, equipment, enclosures, junction boxes, pull boxes, etc. shall be
36 clean and free of stains, dust, dirt, debris, oil, grease, paint, and any other foreign material.
37 3. The interiors of equipment enclosures, junction boxes, pull boxes, etc. shall be clean and free of
38 wire/cable scraps, pieces of wire/cable insulation, stains, dust, dirt, debris, oil, grease, paint, and any
39 other foreign material.
40 4. Remove temporary labels not used for instruction or operation.
41 5. Walls and floors of Communications spaces and equipment rooms shall be clean and free of dust,
42 dirt, debris, oil, grease, paint, and any other foreign material.
43 6. Remove and properly dispose of waste materials, trash, rubbish, debris, etc. generated by execution
44 of work under this section.
45 7. Contractor's cleaning protocols shall not include use of any chemicals, compounds, or agents not
46 approved by the material manufacturer for use on their product, that would damage installed
47 materials in any way, or that would invalidate the manufacturer's warranty.

48 **3.22 TRAINING**

- 49 A. Refer to Division 01 for additional information and requirements.
50 B. Refer to 270000 - 1.10 - Submittals for additional information and requirements.
51 C. Refer to technical sections for additional information and requirements specific to work under each section.
52 D. Contractor shall train the Owner's designated representative(s) on the systems provided as part of the work
53 under this Division. Training shall include:
54 1. System topology
55 2. Products that constitute the installed system
56 3. Equipment room layouts
57 4. Location of devices, equipment, etc.
58 5. Labeling scheme logic and label formats
59 6. Core operating principles ("how it works")

- 1 7. Features and functionality
- 2 8. Proper operation
- 3 9. Identification of, recommended schedules for, and execution of required care and maintenance
- 4 10. Troubleshooting and fault diagnosis procedures
- 5 11. Remediation of common faults and repair / replacement of consumable and field-serviceable
- 6 components
- 7 12. Operation and Maintenance Manual and Record Documents
- 8 13. Test results
- 9 14. Applicable warranties
- 10 15. Identification of and contact information for manufacturer and supplier/distributor product support
- 11 E. Provide comprehensive manuals, in electronic and printed form, prepared to provide a written version of
- 12 operation instruction, and use these written manuals as reference materials during in-person verbal training
- 13 sessions. Provide the manuals in .pdf electronic form and provide one (1) printed, bound copy of the
- 14 manuals for each Owner's designated representative attending in-person verbal training sessions, in
- 15 addition to quantity specified to be provided as part of Operation and Maintenance Manuals.
- 16 F. In-person verbal training sessions shall include a walking tour component to observe the installed facility
- 17 and a "classroom" component based on the written manuals.
- 18 G. Coordinate training schedules with Owner and Architect/Engineer. No training session shall be scheduled
- 19 with less than ten (10) business days' advance notification for attendees.
- 20 H. Attendees shall include a minimum of six (6) Owner's designated representatives.
- 21 I. Training shall be held at Project Site and shall be conducted on Owner's standard days of operation during
- 22 Owner's standard working hours.
- 23 J. Ownership of their own, video production equipment for use as future refresher materials for Owner's
- 24 staff.
- 25 K. Refer to technical sections for minimum duration of in-person verbal training sessions specific to work under
- 26 each section.

27 END OF SECTION

28

SECTION 27 25 26

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

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51 PART 1 - GENERAL

52 1.1 SCOPE

53 A. This section includes product and execution requirements for Grounding and Bonding that are unique to
54 communications systems and not included in Division 26 sections.

55 1.2 DESCRIPTION

56 A. Refer to Section 27 0000 - General Communications Requirements.

- 1 B. Grounding and Bonding infrastructure for communications includes Cabling, Busbars and Connectors.
- 2 **RELATED WORK**
- 3 A. Refer to Section 27 0000 - General Communications Requirements.
- 4 **1.4 REQUIREMENTS OF REGULATORY AGENCIES**
- 5 A. Refer to Section 27 0000 - General Communications Requirements.
- 6 **1.5 REFERENCES AND STANDARDS**
- 7 A. Refer to Section 27 0000 - General Communications Requirements.
- 8 **1.6 ABBREVIATIONS AND ACRONYMS**
- 9 A. Refer to Section 27 0000 - General Communications Requirements.
- 10 B. Additional abbreviations and acronyms (per referenced standards):
- 11 1. Telecommunications Main Grounding Busbar - TMBB
- 12 2. Telecommunications Grounding Busbar - TGB
- 13 3. Telecommunications Bonding Backbone - TBB
- 14 4. Grounding Equalizer - GE
- 15 **1.7 DEFINITIONS**
- 16 A. Refer to Section 27 0000 - General Communications Requirements.
- 17 B. Additional definitions (per referenced standards):
- 18 1. Telecommunications Main Grounding Busbar: Busbar placed in convenient and accessible location
- 19 and bonded by means of bonding conductor for telecommunications to building service equipment
- 20 (power) ground.
- 21 2. Telecommunications Grounding Busbar: Interface to building telecommunications grounding
- 22 system generally located in telecommunications room. Common point of connection for
- 23 telecommunications system and equipment bonding to ground, and located in telecommunications
- 24 room or equipment room.
- 25 3. Telecommunications Bonding Conductor: Conductor that interconnects telecommunications
- 26 bonding infrastructure to building's service equipment (power) ground.
- 27 4. Telecommunications Bonding Backbone: Conductor that interconnects tele-communications main
- 28 grounding busbar to telecommunications grounding busbar.
- 29 5. Grounding Equalizer: Conductor that interconnects elements of telecommunications grounding
- 30 infrastructure.
- 31 6. Exothermic Weld: Method of permanently bonding two metals together by controlled heat reaction
- 32 resulting in molecular bond.
- 33 7. Irreversible Compression: Permanent mechanical bond between conductors or conductor and
- 34 connector using mechanical or hydraulic tool.
- 35 **1.8 WORK BY OWNER**
- 36 A. Refer to Section 27 0000 - General Communications Requirements.
- 37 **1.9 QUALITY ASSURANCE**
- 38 A. Refer to Section 27 0000 - General Communications Requirements.
- 39 **1.10 SUBMITTALS**
- 40 A. Refer to Section 27 0000 - General Communications Requirements.
- 41 **1.11 WARRANTY**
- 42 A. Refer to Section 27 0000 - General Communications Requirements.
- 43 **PART 2 - PRODUCTS**
- 44 **2.1 GENERAL**
- 45 A. Refer to Section 27 0000 - General Communications Requirements.
- 46 **2.2 LISTING**
- 47 A. Refer to Section 27 0000 - General Communications Requirements.

- 1 **2.3 PRODUCT SUBSTITUTIONS**
2 A. Refer to Section 27 0000 - General Communications Requirements.
- 3 **2.4 TELECOMMUNICATIONS GROUNDING BUSBARS**
4 A. Features:
5 1. Wall mount
6 2. Integral insulators
7 3. Stainless steel mounting brackets
8 4. Pre-drilled holes
9 5. Hole sizes and pattern per ANSI/TIA-607-C
10 B. Specifications:
11 1. Material: Copper
12 2. Dimensions:
13 a. Thickness: $\geq 1/4"$
14 b. Width x Height:
15 1) Telecommunications Main Ground Busbar (TMGB) – $\geq 20" \times 4"$
16 2) Telecommunications Grounding Busbar (TGB) – $\geq 12" \times 2"$
17 3. Hole Pattern:
18 a. ≥ 15 sets of $5/16"$ holes spaced $5/8"$ on center
19 1) For "A" spaced 2-hole compression lugs
20 b. \geq three (3) sets of $7/16"$ holes spaced $1"$ on center
21 1) For "C" spaced 2-hole compression lugs
- 22 **2.5 RACK MOUNT TELECOMMUNICATIONS GROUNDING BUSBARS**
23 A. Features
24 1. Rack mount
25 2. Pre-drilled holes
26 3. Mounts in a standard 19" equipment rack
27 B. Specifications
28 1. Material: Copper
29 2. Dimensions: $3/16"$ thick x $1-1/2"$ high x 19" long
30 3. Hole Pattern:
31 a. ≥ 19 sets of $5/16"$ holes spaced $5/8"$ on center
32 b. For "A" spaced 2-hole compression lugs
- 33 **2.6 CONDUCTORS**
34 A. Material:
35 1. Bare Copper:
36 a. Annealed uncoated stranded conductor
37 2. Insulated Copper:
38 a. Annealed uncoated stranded conductor
39 b. Insulation:
40 1) PVC insulation with nylon outer jacket
41 2) Rated ≥ 600 volts
42 3) Green or marked with green tape or green adhesive labels per NEC
43 B. Conductors shall be listed and recognized by a nationally recognized testing laboratory as being suitable
44 for the intended purpose and for installation in the space in which they are installed.
45 C. Size:
46 1. Bonding Conductor for Telecommunications (BCT) (TMGB to Grounding Electrode):
47 a. Up to 66 ft - 2/0 AWG
48 b. Greater-than 66 ft - 3/0 AWG
49 c. BCT shall be the same size as the TBB or larger.
50 2. Telecommunications Bonding Backbone (TBB; TMGB to TGB):
51 a. Up to 66 ft - 2/0 AWG
52 b. Greater-than 66 ft - 3/0 AWG
53 3. Grounding Equalizer (GE):
54 a. GE shall be the same size as the TBB.
55 4. Bonding Conductors (BC)
56 a. Does not include BCT, TBB, or GE
57 b. Sized by length as follows:
58

Length Linear ft (m)	Size (AWG)
Less than 13 (4)	6
14 - 20 (4 - 6)	4
21 - 26 (6 - 8)	3
27 - 33 (8 - 10)	2
34 - 41 (10 - 13)	1
42 - 52 (13 - 16)	1/0
53 - 66 (16 - 20)	2/0
Greater than 66 (20)	3/0

- 1 2.7 CONNECTORS
- 2 A. Features:
- 3 1. Irreversible compression type
- 4 2. IEEE 837 and UL 467 compliant
- 5 3. Factory filled with an oxide-inhibiting compound
- 6 4. Clearly marked with:
- 7 a. Manufacturer
- 8 b. Catalog number
- 9 c. Conductor size
- 10 d. Required compression tool settings
- 11 B. Specifications:
- 12 1. Material: Aluminum alloy
- 13 2. Conductivity: $\geq 99\%$ by IACS standards
- 14 3. Lug Type: Two-hole

15 **PART 3 - EXECUTION**

- 16 3.1 GENERAL
- 17 A. Refer to Section 27 0000 - General Communications Requirements.
- 18 3.2 WORK SEQUENCE
- 19 A. Refer to Section 27 0000 - General Communications Requirements.
- 20 B. Permanently attach communications grounds prior to energizing communications equipment.
- 21 3.3 TEMPORARY SERVICES
- 22 A. Refer to Section 27 0000 - General Communications Requirements.
- 23 3.4 BUILDING ACCESS
- 24 A. Refer to Section 27 0000 - General Communications Requirements.
- 25 3.5 DAMAGE
- 26 A. Refer to Section 27 0000 - General Communications Requirements.
- 27 3.6 DEMOLITION
- 28 A. Refer to Section 27 0000 - General Communications Requirements.
- 29 3.7 CONTINUITY OF SERVICES
- 30 A. Refer to Section 27 0000 - General Communications Requirements.
- 31 3.8 DELIVERY, STORAGE, AND HANDLING
- 32 A. Refer to Section 27 0000 - General Communications Requirements.
- 33 3.9 LOCATIONS OF WORK
- 34 A. Refer to Section 27 0000 - General Communications Requirements.

- 1 3.10 CONCRETE WORK
2 A. Refer to Section 27 0000 - General Communications Requirements.
- 3 3.11 HOUSEKEEPING PADS
4 A. Refer to Section 27 0000 - General Communications Requirements.
- 5 3.12 CUTTING AND PATCHING
6 A. Refer to Section 27 0000 - General Communications Requirements.
- 7 3.13 FLOOR, WALL, ROOF, AND CEILING OPENINGS
8 A. Refer to Section 27 0000 - General Communications Requirements.
- 9 3.14 EQUIPMENT ACCESS
10 A. Refer to Section 27 0000 - General Communications Requirements.
- 11 3.15 EQUIPMENT SUPPORTS
12 A. Refer to Section 27 0000 - General Communications Requirements.
- 13 3.16 SUPPORT PROTECTION
14 A. Refer to Section 27 0000 - General Communications Requirements.
- 15 3.17 INSTALLATION
16 A. Refer to Section 27 0000 - General Communications Requirements.
17 B. General:
18 1. Provide required elements and miscellaneous hardware necessary to establish Telecommunication
19 Grounding infrastructure as specified.
20 2. A licensed electrician shall perform all bonding.
21 3. Ground all metallic communications support equipment.
22 4. Install Products in accordance with manufacturer's instructions.
23 C. Conductors:
24 1. Conductors shall be continuous and splice-free.
25 2. Bonding conductors shall be green or marked with a distinctive green color.
26 3. Route conductors parallel and perpendicular to building structure along shortest and straightest
27 paths possible to minimize number of bends and changes in direction. Install and secure
28 conductors to protect them from impact and physical or mechanical strain or damage.
29 4. Maintain a minimum 1 foot (300 mm) separation between conductors and DC power cables,
30 switchboard cable, and high frequency cable.
31 5. Refer to Section 27 0553 for labeling requirements.
32 6. Interior water piping is not acceptable for use as a conductor.
33 7. Metallic cable shields are not acceptable for use as a conductor.
34 D. Terminations and Connections:
35 1. Exothermic weld connections are not allowed.
36 2. Connections shall be bare metal to bare metal contact. Clean surfaces of paint, dirt, oil, etc. prior
37 to applying connectors and making connections.
38 3. Conductors shall be terminated with Compression type connectors.
39 a. Mechanical connectors are not allowed.
40 b. One-hole lug connectors are not allowed.
41 c. Install Compression Connectors with compression, tool, and die system, as recommended
42 by manufacturer of connectors.
43 d. Terminate each grounding conductor on its own terminal lug. Multiple conductors on single
44 lug not permitted.
45 4. Connections shall be tight and shall be made with UL listed grounding devices, fittings, bushings,
46 etc.
47 5. Coat connections with anti-oxidant joint compound purpose-designed and purpose-manufactured
48 for that use.
49 6. Connections shall be exposed and visible for inspection at all times. Do not install insulation over
50 connections.
51 E. Telecommunications Main Ground Bar (TMGB) and Telecommunications Ground Bar (TGB):
52 1. Provide with dimensions or in quantity to support terminations required; plus 20% spare capacity.
53 2. Locate TMGB and TGBs as indicated on drawings.

3. Insulate TMGB and TGBs from its support.
 4. Bond TMGB to the electrical service ground via the Bonding Conductor for Telecommunications (BCT).
 5. Bond TGBs to TMGB via the Telecommunications Bonding Backbone (TBB) via tap off of TBB.
 - a. Exception is "last" TGB on TBB (i.e., furthest from TMGB).
 6. Bond TMGB and TGBs to electrical panels located in the same room or space and in adjacent spaces within 20 linear feet of the TMGB or a TGB. Bond TMGB and TGBs and to all electrical panels providing electrical power to active electronics and equipment located in the same room or space as the TMGB or a TGB.
 7. Bond TMGB and TGBs to accessible metallic building structure located in the same room or space as the TMGB or a TGB.
 8. Bond metallic continuous cable pathways, including cable trays, basket trays, ladder racks, raceways, conduits, conduit sleeves, fire-rated cable pathway devices, etc. located in the same room or space as the TMGB or a TGB to the TMGB or TGB.
 9. Bond metallic Communications Equipment Room equipment, including patch panels, surge suppressors, cross-connect frames, patch panels, equipment cabinets, etc. located in the same room or space as the TMGB or a TGB to the TMGB or TGB.
 10. Bond Contractor-provided active electronics and equipment located in the same room or space as the TMGB or a TGB to the TMGB or TGB.
 11. Where cable contains a shield, bond the shield of such cables terminated in the same room or spaces as the TMGB or a TGB to the TMGB or TGB.
 - a. Where shielded cable routes between Communication Equipment Rooms, bond the shield of such cables to TMGB or TGB in one (1) Communication Equipment Room only, typically the origin Communication Equipment Room.
 12. Where multiple Communication Equipment Rooms are located on a floor in a building containing more than five stories, bond TGBs on the first, last, and every third intermediate floor together horizontally via Grounding Equalizer (GE). Gauge of GEs shall match that of the TBB.
- F. Rack Mount Telecommunications Ground Bar
1. Provide with dimensions or in quantity to support terminations required, plus 20% spare capacity.
 2. Provide a rack-mount telecommunications ground bar in each equipment rack and equipment rack enclosure.
 3. Install rack mount telecommunications ground bar such that it is electrically bonded to the equipment rack or equipment rack enclosure. Remove paint or use paint-piercing washers to ensure electrical bond between rack mount telecommunications ground bar and equipment rack or equipment rack enclosure.
 4. Bond each rack mount telecommunications ground bar to the TMGB or TGB in the same room or space as the rack mount telecommunications ground bar via a Bonding Conductor (BC).
 5. Where multiple rack mount telecommunications ground bars are provided within the same room or space, bond together via a BC.
 6. Where cable contains a shield, bond the shield of such cables terminated in the same equipment rack or equipment rack enclosure as the rack mount telecommunications ground bar to the rack mount telecommunications ground bar.
 - a. Where shielded cable routes between Communication Equipment Rooms, bond the shield of such cables to rack mount telecommunications ground bar in one (1) Communication Equipment Room only, typically the origin Communication Equipment Room.
 - b. Where shielded cable routes between equipment racks or equipment rack enclosures, bond the shield of such cables to rack mount telecommunications ground bar in one (1) equipment rack or equipment rack enclosure only, typically the origin equipment rack or equipment rack enclosure.
 7. Bond Contractor-provided metallic communications equipment, including patch panels, splice enclosures, etc. mounted in the same equipment rack or equipment rack enclosure as the rack mount telecommunications ground bar to the rack mount telecommunications ground bar. Remove paint or use paint-piercing washers to provide proper electrical bond between equipment rack and installed metallic communications equipment.
 8. Bond Contractor-provided active electronics and equipment and uninterruptible power supplies. mounted in the same equipment rack or equipment rack enclosure as the rack mount telecommunications ground bar to the rack mount telecommunications ground bar via dedicated BC for each device.
- G. Continuous Metallic Pathways
1. Continuous metallic pathways, including conduit, cable tray, cable duct, etc. shall be made electrically continuous along their entire length.

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SECTION 27 05 28.29

HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

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44 3.23 START-UP
45 3.24 ATTIC STOCK
46 3.25 DOCUMENTATION
47 3.26 CLEANING
48 3.27 TRAINING

49 PART 1 - GENERAL

50 1.1 SCOPE

- 51 A. This section includes product and execution requirements for items unique to communications systems
52 and not included in Division 26 sections.

53 1.2 DESCRIPTION

- 54 A. Refer to Section 27 0000 - General Communications Requirements.
55 B. Hangers and supports for communications systems unique to communications systems include:
56 1. Hanger Rods

- 1 2. Beam Clamps
2 3. Wall Anchors
- 3 **1.3 RELATED WORK**
4 A. Refer to Section 27 0000 - General Communications Requirements.
- 5 **1.4 REQUIREMENTS OF REGULATORY AGENCIES**
6 A. Refer to Section 27 0000 - General Communications Requirements.
- 7 **1.5 REFERENCES AND STANDARDS**
8 A. Refer to Section 27 0000 - General Communications Requirements.
- 9 **1.6 ABBREVIATIONS AND ACRONYMS**
10 A. Refer to Section 27 0000 - General Communications Requirements.
- 11 **1.7 DEFINITIONS**
12 A. Refer to Section 27 0000 - General Communications Requirements.
- 13 **1.8 WORKMAN QUALITY**
14 A. Refer to Section 27 0000 - General Communications Requirements.
- 15 **1.9 QUALITY ASSURANCE**
16 A. Refer to Section 27 0000 - General Communications Requirements.
- 17 **1.10 SUBMITTALS**
18 A. Refer to Section 27 0000 - General Communications Requirements.
- 19 **1.11 WARRANTY**
20 A. Refer to Section 27 0000 - General Communications Requirements.
- 21 **PART 2 - INCLUDES**
- 22 **2.1 GENERAL**
23 A. Refer to Section 27 0000 - General Communications Requirements.
- 24 **2.2 LISTING**
25 A. Refer to Section 27 0000 - General Communications Requirements.
- 26 **2.3 PRODUCT SUBSTITUTIONS**
27 A. Refer to Section 27 0000 - General Communications Requirements.
- 28 **2.4 PRODUCTS COMMON WITH ELECTRICAL SYSTEMS**
29 A. Refer to Section 26 0529 - Hangers and Supports for Electrical Systems - Part 3 for:
30 1. Hanger Rods
31 2. Beam Clamps
32 3. Wall Anchors
33 4. Metal Framing
- 34 **2.5 J-TYPE CABLE SUPPORT HOOKS**
35 1. Not Allowed.
- 36 **PART 3 - EXECUTION**
- 37 **3.1 GENERAL**
38 A. Refer to Section 270000 for information and requirements.

- 1 **3.2 WORK SEQUENCE**
2 A. Refer to Section 270000 for information and requirements.
- 3 **3.3 TEMPORARY SERVICES**
4 A. Refer to Section 270000 for information and requirements.
- 5 **3.4 BUILDING ACCESS**
6 A. Refer to Section 270000 for information and requirements.
- 7 **3.5 DAMAGE**
8 A. Refer to Section 270000 for information and requirements.
- 9 **3.6 DEMOLITION**
10 A. Refer to Section 270000 for information and requirements.
- 11 **3.7 CONTINUITY OF SERVICES**
12 A. Refer to Section 270000 for information and requirements.
- 13 **3.8 DELIVERY, STORAGE, AND HANDLING**
14 A. Refer to Section 270000 for information and requirements.
- 15 **3.9 LOCATIONS OF WORK**
16 A. Refer to Section 270000 for information and requirements.
- 17 **3.10 CONCRETE WORK**
18 A. Refer to Section 270000 for information and requirements.
- 19 **3.11 HOUSEKEEPING PADS**
20 A. Refer to Section 270000 for information and requirements.
- 21 **3.12 CUTTING AND PATCHING**
22 A. Refer to Section 270000 for information and requirements.
- 23 **3.13 FLOOR, WALL, ROOF, AND CEILING OPENINGS**
24 A. Refer to Section 270000 for information and requirements.
- 25 **3.14 EQUIPMENT ACCESS**
26 A. Refer to Section 270000 for information and requirements.
- 27 **3.15 EQUIPMENT SUPPORTS**
28 A. Refer to Section 270000 for information and requirements.
- 29 **3.16 SUPPORT PROTECTION**
30 A. Refer to Section 270000 for information and requirements.
- 31 **3.17 INSTALLATION**
32 A. Products Common with Electrical Systems
33 1. Refer to Section 26 0529 - Hangers and Supports for Electrical Systems - Part 3 for all products
34 identified in Part 1.
35 B. J-Type Cable Support Hooks
36 1. Not allowed.
- 37 **3.18 PAINTING**
38 A. Refer to Section 270000 for information and requirements.
- 39 **3.19 CLEANING AND REPAIR OF EXISTING MATERIALS**
40 A. Refer to Section 270000 for information and requirements.

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- 1 3.20 UTILITY SERVICES
2 A. Refer to Section 270000 for information and requirements.
- 3 3.21 CABLE AND CONDUCTOR PROTECTION
4 A. Refer to Section 270000 for information and requirements.
- 5 3.22 TESTING
6 A. Refer to Section 270000 for information and requirements.
- 7 3.23
8 A. Refer to Section 270000 for information and requirements.
- 9 3.24 ATTIC STOCK
10 A. Refer to Section 270000 for information and requirements.
- 11 3.25 DOCUMENTATION
12 A. Refer to Section 270000 for information and requirements.
- 13 3.26 CLEANING
14 A. Refer to Section 270000 for information and requirements.
- 15 3.27 TRAINING
16 A. Refer to Section 270000 for information and requirements.
- 17
18

END OF SECTION

SECTION 27 05 28.33

RACEWAY AND BOXES FOR COMMUNICATIONS SYSTEMS

- 1
2
3 PART 1 - GENERAL
4 1.1 SCOPE
5 1.2 DESCRIPTION
6 1.3 RELATED WORK
7 1.4 REQUIREMENTS OF REGULATORY AGENCIES
8 1.5 REFERENCES AND STANDARDS
9 1.6 ABBREVIATIONS AND ACRONYMS
10 1.7 DEFINITIONS
11 1.8 WORK BY OWNER
12 1.9 QUALITY ASSURANCE
13 1.10 SUBMITTALS
14 1.11 WARRANTY
15 PART 2 - PRODUCTS
16 2.1 GENERAL
17 2.2 LISTING
18 2.3 PRODUCT SUBSTITUTIONS
19 2.4 PRODUCTS COMMON WITH ELECTRICAL SYSTEMS
20 2.5 MULTI-CELL FLEXIBLE RACEWAY
21 PART 3 - EXECUTION
22 3.1 GENERAL
23 3.2 WORK SEQUENCE
24 3.3 TEMPORARY SERVICES
25 3.4 BUILDING ACCESS
26 3.5 DAMAGE
27 3.6 DEMOLITION
28 3.7 CONTINUITY OF SERVICES
29 3.8 DELIVERY, STORAGE, AND HANDLING
30 3.9 LOCATIONS OF WORK
31 3.10 CONCRETE WORK
32 3.11 HOUSEKEEPING PADS
33 3.12 CUTTING AND PATCHING
34 3.13 FLOOR, WALL, ROOF, AND CEILING OPENINGS
35 3.14 EQUIPMENT ACCESS
36 3.15 EQUIPMENT SUPPORTS
37 3.16 SUPPORT PROTECTION
38 3.17 INSTALLATION
39 3.18 PAINTING
40 3.19 CLEANING AND REPAIR OF EXISTING MATERIALS
41 3.20 UTILITY SERVICES
42 3.21 CABLE AND CONDUCTOR PROTECTION
43 3.22 TESTING
44 3.23 START-UP
45 3.24 ATTIC STOCK
46 3.25 DOCUMENTATION
47 3.26 CLEANING
48 3.27 TRAINING

49 PART 1 - GENERAL

- 50 1.1 SCOPE
51 A. This section includes product and execution requirements for items unique to communications and not
52 included in Division 26 sections.
- 53 1.2 DESCRIPTION
54 A. Refer to Section 27 0000 - General Communications Requirements.
55 B. Raceway and boxes for communications systems include:
56 1. Outlet Boxes

- 1 Pull and Junction Boxes
2 Raceways and Wireways (including sleeves, expansion fittings, penetrations and seals)
3 Indoor Service Poles
4 5. Poke-through Fittings
5 6. Floor Boxes
6 7. Multi-cell Flexible Raceway
- 7 1.3 RELATED WORK
8 A. Refer to Section 27 0000 - General Communications Requirements.
- 9 1.4 REQUIREMENTS OF REGULATORY AGENCIES
10 A. Refer to Section 27 0000 - General Communications Requirements.
- 11 1.5 REFERENCES AND STANDARDS
12 A. Refer to Section 27 0000 - General Communications Requirements.
- 13 1.6 ABBREVIATIONS AND ACRONYMS
14 A. Refer to Section 27 0000 - General Communications Requirements.
- 15 1.7 DEFINITIONS
16 A. Refer to Section 27 0000 - General Communications Requirements.
- 17 1.8 WORK BY OWNER
18 A. Refer to Section 27 0000 - General Communications Requirements.
- 19 1.9 QUALITY ASSURANCE
20 A. Refer to Section 27 0000 - General Communications Requirements.
- 21 1.10 SUBMITTALS
22 A. Refer to Section 27 0000 - General Communications Requirements.
- 23 1.11 WARRANTY
24 A. Refer to Section 27 0000 - General Communications Requirements.
- 25 PART 2 - PRODUCTS
- 26 2.1 GENERAL
27 A. Refer to Section 27 0000 - General Communications Requirements.
- 28 2.2 LISTING
29 A. Refer to Section 27 0000 - General Communications Requirements.
- 30 2.3 PRODUCT SUBSTITUTIONS
31 A. Refer to Section 27 0000 - General Communications Requirements.
- 32 2.4 PRODUCTS COMMON WITH ELECTRICAL SYSTEMS
33 A. Refer to Section 26 0533 - Raceway and Boxes for Electrical Systems - Part 2 for Outlet Boxes for
34 Communications, Pull and Junctions Boxes for Communications, Raceways for Communications, and
35 other products identified in Part 1.
36 1. Box Size:
37 a. ≥ 4 " square x 2-1/8" deep
38 2. Conduit
39 a. Type:
40 1) Unless noted otherwise, no flexible conduit of any type.
41 b. Size:
42 1) Structured Cabling: ≥ 1 -1/4"
43 2) Systems: $\geq 3/4$ "

- 1 3. Box Connectors:
2 a. Type: Insulated, with integral nylon bushing
- 3 **2.5 MULTI-CELL FLEXIBLE RACEWAY**
4 A. Manufacturers: MaxCell™.
5 B. Innerduct shall be a flexible, multi-celled, textile innerduct system designed for communications.
6 C. Innerduct shall meet the following physical requirements:
7 1. Tensile strength: 2500 lbs or better
8 2. Melting Point: 480°F or better
9 3. Resistant to ground chemicals and petroleum products
10 4. Unaffected by mud, silt or debris after placement of cable.
11 D. Innerduct shall be pre-lubricated for lower friction during innerduct and cable installation.
12 E. Innerduct Color shall be WHITE.
13 1. Innerduct shall include a color coded stripe allowing for identification of each bundle.
14 F. Each cell shall include a color-coded pull tape.
15 G. Product shall be available in a variety of sizes and cell counts. Refer to project documents for exact
16 configuration.

17 **PART 3 - EXECUTION**

- 18 **3.1 GENERAL**
19 A. Refer to Section 270000 for information and requirements.
- 20 **3.2 WORK SEQUENCE**
21 A. Refer to Section 270000 for information and requirements.
- 22 **3.3 TEMPORARY SERVICES**
23 A. Refer to Section 270000 for information and requirements.
- 24 **3.4 BUILDING ACCESS**
25 A. Refer to Section 270000 for information and requirements.
- 26 **3.5 DAMAGE**
27 A. Refer to Section 270000 for information and requirements.
- 28 **3.6 DEMOLITION**
29 A. Refer to Section 270000 for information and requirements.
- 30 **3.7 CONTINUITY OF SERVICES**
31 A. Refer to Section 270000 for information and requirements.
- 32 **3.8 DELIVERY, STORAGE, AND HANDLING**
33 A. Refer to Section 270000 for information and requirements.
- 34 **3.9 LOCATIONS OF WORK**
35 A. Refer to Section 270000 for information and requirements.
- 36 **3.10 CONCRETE WORK**
37 A. Refer to Section 270000 for information and requirements.
- 38 **3.11 HOUSEKEEPING PADS**
39 A. Refer to Section 270000 for information and requirements.
- 40 **3.12 CUTTING AND PATCHING**
41 A. Refer to Section 270000 for information and requirements.
- 42 **3.13 FLOOR, WALL, ROOF, AND CEILING OPENINGS**
43 A. Refer to Section 270000 for information and requirements.

- 1 3.14 **EQUIPMENT ACCESS**
2 A. Refer to Section 270000 for information and requirements.
- 3 3.15 **EQUIPMENT SUPPORTS**
4 Refer to Section 270000 for information and requirements.
- 5 3.16 **SUPPORT PROTECTION**
6 A. Refer to Section 270000 for information and requirements.
- 7 3.17 **INSTALLATION**
8 A. Products Common with Electrical Systems
9 1. Refer to Section 26 0533 - Raceway and Boxes for Electrical Systems - Part 3 for Outlet Boxes for
10 Communications, Pull and Junctions Boxes for Communications, Raceways for Communications,
11 and other products identified in Part 1.
12 2. Boxes:
13 a. Size as indicated herein and per applicable code, associated cabling and device(s) served,
14 and manufacturer's recommendations.
15 3. Conduit:
16 a. Size as indicated herein and per applicable code, associated cabling and device(s) served,
17 and manufacturer's recommendations.
18 b. No conduit shall contain > 180° of total cumulative bend between boxes or pull points.
19 c. No conduit shall exceed 100 feet in length between boxes or pull points.
20 d. Provide nylon bushing on exposed ends of conduits not connected to a box.
21 B. Multi-Cell Flexible Raceway
22 1. Segment conduits to increase capacity.
23 a. Provide 3-cell flexible raceway within all telecommunications service conduits.
24 2. Install per manufacturers recommendations.
- 25 3.18 **PAINTING**
26 A. Refer to Section 270000 for information and requirements.
- 27 3.19 **CLEANING AND REPAIR OF EXISTING MATERIALS**
28 A. Refer to Section 270000 for information and requirements.
- 29 3.20 **UTILITY SERVICES**
30 A. Refer to Section 270000 for information and requirements.
- 31 3.21 **CABLE AND CONDUCTOR PROTECTION**
32 A. Refer to Section 270000 for information and requirements.
- 33 3.22 **TESTING**
34 A. Refer to Section 270000 for information and requirements.
35 B. Test all metallic pathways to confirm electrical continuity throughout. Refer to Section 270526 for
36 additional information and requirements.
- 37 3.23 **START-UP**
38 A. Refer to Section 270000 for information and requirements.
- 39 3.24 **ATTIC STOCK**
40 A. Refer to Section 270000 for information and requirements.
- 41 3.25 **DOCUMENTATION**
42 A. Refer to Section 270000 for information and requirements.
- 43 3.26 **CLEANING**
44 A. Refer to Section 270000 for information and requirements.

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1 3.27 TRAINING
2 A. Refer to Section 270000 for information and requirements.

3 END OF SECTION

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SECTION 27 05 53

COMMUNICATIONS SYSTEMS IDENTIFICATION

- 1
- 2
- 3 PART 1 - GENERAL
- 4 1.1 SCOPE
- 5 1.2 DESCRIPTION
- 6 1.3 RELATED WORK
- 7 1.4 REQUIREMENTS OF REGULATORY AGENCIES
- 8 1.5 REFERENCES AND STANDARDS
- 9 1.6 ABBREVIATIONS AND ACRONYMS
- 10 1.7 DEFINITIONS
- 11 1.8 WORK BY OWNER
- 12 1.9 QUALITY ASSURANCE
- 13 1.10 SUBMITTALS
- 14 1.11 WARRANTY
- 15 PART 2 - PRODUCTS
- 16 2.1 GENERAL
- 17 2.2 LISTING
- 18 2.3 PRODUCT SUBSTITUTIONS
- 19 2.4 LABELS
- 20 PART 3 - EXECUTION
- 21 3.1 GENERAL
- 22 3.2 WORK SEQUENCE
- 23 3.3 TEMPORARY SERVICES
- 24 3.4 BUILDING ACCESS
- 25 3.5 DAMAGE
- 26 3.6 DEMOLITION
- 27 3.7 CONTINUITY OF SERVICES
- 28 3.8 DELIVERY, STORAGE, AND HANDLING
- 29 3.9 LOCATIONS OF WORK
- 30 3.10 CONCRETE WORK
- 31 3.11 HOUSEKEEPING PADS
- 32 3.12 CUTTING AND PATCHING
- 33 3.13 FLOOR, WALL, ROOF, AND CEILING OPENINGS
- 34 3.14 EQUIPMENT ACCESS
- 35 3.15 EQUIPMENT SUPPORTS
- 36 3.16 SUPPORT PROTECTION
- 37 3.17 INSTALLATION
- 38 3.18 PAINTING
- 39 3.19 CLEANING AND REPAIR OF EXISTING MATERIALS
- 40 3.20 UTILITY SERVICES
- 41 3.21 CABLE AND CONDUCTOR PROTECTION
- 42 3.22 TESTING
- 43 3.23 START-UP
- 44 3.24 ATTIC STOCK
- 45 3.25 DOCUMENTATION
- 46 3.26 CLEANING
- 47 3.27 TRAINING

48 PART 1 - GENERAL

49 1.1 SCOPE

- 50 A. This section details product and execution requirements for labeling of communications cabling, termination
51 components, pathways, and spaces for Communications Systems.

52 1.2 DESCRIPTION

- 53 A. Refer to Section 27 0000 - General Communications Requirements.
54 B. Communications systems identification includes unique alphanumeric labeling of:
55 1. Rooms
56 2. Equipment racks and cabinets

- 1 3. Systems control panels and head end equipment
- 2 4. Backbone cables
- 3 5. Horizontal cables
- 4 6. Termination hardware
- 5 7. Telecommunications Outlets
- 6 8. Systems devices
- 7 9. Grounding and bonding components

- 8 1.3 RELATED WORK
- 9 A. Refer to Section 27 0000 - General Communications Requirements.

- 10 1.4 REQUIREMENTS OF REGULATORY AGENCIES
- 11 A. Refer to Section 27 0000 - General Communications Requirements.

- 12 1.5 REFERENCES AND STANDARDS
- 13 A. Refer to Section 27 0000 - General Communications Requirements.

- 14 1.6 ADMINISTRATION AND ACCEPTANCE
- 15 A. Refer to Section 27 0000 - General Communications Requirements.

- 16 1.7 DEFINITIONS
- 17 A. Refer to Section 27 0000 - General Communications Requirements.

- 18 1.8 WORK BY OWNER
- 19 A. Refer to Section 27 0000 - General Communications Requirements.

- 20 1.9 QUALITY ASSURANCE
- 21 A. Refer to Section 27 0000 - General Communications Requirements.

- 22 1.10 SUBMITTALS
- 23 A. Refer to Section 27 0000 - General Communications Requirements.
- 24 B. Submit with shop drawings samples of label types planned for the project.
- 25 1. Samples shall include examples of lettering to be used and examples of identification logic specified
- 26 herein.

- 27 1.11 WARRANTY
- 28 A. Refer to Section 27 0000 - General Communications Requirements.

- 29 **PART 2 - PRODUCTS**

- 30 2.1 GENERAL
- 31 A. Refer to Section 27 0000 - General Communications Requirements.

- 32 2.2 LISTING
- 33 A. Refer to Section 27 0000 - General Communications Requirements.

- 34 2.3 PRODUCT SUBSTITUTIONS
- 35 A. Refer to Section 27 0000 - General Communications Requirements.

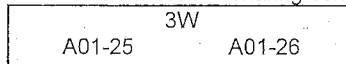
- 36 2.4 LABELS
- 37 A. Labels and markings shall be physically and chemically resistant to damage that would make label
- 38 unreadable.
- 39 B. Cable labels shall be self-laminating, White/Transparent Vinyl (or other substrates facilitating easy
- 40 application and flex as cables are bent) and incorporate an integrated clear lamination which covers printed
- 41 part of label when label is wrapped around cable.
- 42 1. If cable jacket is white, provide cable label with printing area that is a color other than white to easily
- 43 distinguish label from cable jacket.

- 1 2. Labels shall be of adequate size to accommodate circumference of cable(s) being marked and
- 2 properly self-laminate over full extent of printed area of label.
- 3 3. Labels on larger cables (e.g. Copper Backbone) may be wrapped with clear non-removable tape.
- 4 C. Labels shall use aggressive adhesives that stay attached even to the most difficult to adhere to jacketing.
- 5 Tags shall be non-removable.
- 6 1. Exceptions:
- 7 a. Telecommunications Outlet labels that are placed in recessed label holders.
- 8 b. Telecommunications Ground tags secured with cable ties.
- 9 c. Innerduct Tags secured with cable ties.
- 10 D. Labels for 110-type Termination Blocks shall be Color-coded to indicate the cable type (inter-building, intra-
- 11 building backbone, horizontal, etc.). Refer to Part 3.
- 12 E. Tags shall be non-removable.
- 13 1. Exceptions:
- 14 a. Telecommunications Outlet labels that are placed in recessed label holders.
- 15 b. Telecommunications Ground tags secured with cable ties.
- 16 c. Innerduct Tags secured with cable ties.
- 17 F. Labels shall match hardware layout and design.
- 18 G. Labels shall be as large as practicable while fitting properly.

19 **PART 3 - EXECUTION**

- 20 **3.1 GENERAL**
- 21 A. Refer to Section 270000 for information and requirements.
- 22 **3.2 WORK SEQUENCE**
- 23 A. Refer to Section 270000 for information and requirements.
- 24 **3.3 TEMPORARY SERVICES**
- 25 A. Refer to Section 270000 for information and requirements.
- 26 **3.4 BUILDING ACCESS**
- 27 A. Refer to Section 270000 for information and requirements.
- 28 **3.5 DAMAGE**
- 29 A. Refer to Section 270000 for information and requirements.
- 30 **3.6 DEMOLITION**
- 31 A. Refer to Section 270000 for information and requirements.
- 32 **3.7 CONTINUITY OF SERVICES**
- 33 A. Refer to Section 270000 for information and requirements.
- 34 **3.8 DELIVERY, STORAGE, AND HANDLING**
- 35 A. Refer to Section 270000 for information and requirements.
- 36 **3.9 LOCATIONS OF WORK**
- 37 A. Refer to Section 270000 for information and requirements.
- 38 **3.10 CONCRETE WORK**
- 39 A. Refer to Section 270000 for information and requirements.
- 40 **3.11 HOUSEKEEPING PADS**
- 41 A. Refer to Section 270000 for information and requirements.
- 42 **3.12 CUTTING AND PATCHING**
- 43 A. Refer to Section 270000 for information and requirements.

- 1 3.13 FLOOR, WALL, ROOF, AND CEILING OPENINGS
2 A. Refer to Section 270000 for information and requirements.
- 3 3.14 EQUIPMENT ACCESS
4 A. Refer to Section 270000 for information and requirements.
- 5 3.15 EQUIPMENT SUPPORTS
6 Refer to Section 270000 for information and requirements.
- 7 3.16 SUPPORT PROTECTION
8 A. Refer to Section 270000 for information and requirements.
- 9 3.17 INSTALLATION
10 A. General
11 1. All components shall be clearly labeled to identify them as unique throughout the project.
12 2. Labeling shall be by mechanical means.
13 a. Hand lettered designations are not allowed.
14 3. Characters shall be Black Ink and printed on background of contrasting color.
15 4. No lettering shall be smaller than 10-point.
16 5. Label cables with tag which is wrapped around cable sheath.
17 a. Clean cable sheath thoroughly before applying label.
18 b. Labels shall not be obscured by termination hardware.
- 19 B. Room Identification
20 1. Label Communications Backboard or Equipment Rack closest to entry door with unique identifying
21 code.
22 2. Characters shall be 1" minimum.
23 3. Room ID shall be ROOM NUMBER.
- 24 C. Equipment Rack Identification
25 1. Label each Equipment Rack with unique identifying code as follows:
26 a. TR-##, where:
27 1) "TR" is identifier for room where rack is located
28 2) "##" is sequential number for rack starting at "01".
29 2. Position Labels at top of rack.
30 3. Characters shall be 1-inch minimum.
- 31 D. Telecommunications Outlet
32 1. Label each Telecommunications Outlet (TO) connector with unique identifying code.
33 2. Telecommunications Outlet connector numbering shall result in logical numbering sequence in work
34 area.
35 a. Labeling plans that results in random TO numbering in work area are not acceptable.
36 3. Place Faceplate labels on outside of cover.
37 4. Position Labels in recessed label holders on faceplate and covered with clear plastic covers.
38 a. Where Communications Outlet Faceplates not incorporating recessed holders are allowed,
39 faceplate labels shall be protected with clear laminate.
40 5. Telecommunications Outlet labeling code shall be as follows:
41 a. TR-RPP-##, where:
42 1) "TR" is identifier for room where cable terminates in horizontal cross-connect.
43 2) "R" is identifier for Equipment Rack where cable terminates
44 a) Alpha character starting at "A".
45 "PP" is Patch Panel on which cable is terminated at HC.
46 a) Number starting at "01".
47 b) Panel numbering shall be from Top (of Rack) to Bottom.
48 3) "##" is sequential POSITION of Jack on Panel
49 a) 1 - 48 is typical
50 b) Position sequence shall be Left-Right and Top-Bottom.
51 b. Example: "3W-A03-25" represents 25th Jack Position in 3rd Panel on Equipment Rack "A" in
52 Telecom Room "3W".
53 1) Faceplate labels can use common TR identifiers on each label strip. For example, two
54 data jacks served from TR 3W sharing common label strip may be represented by:



- 1 E. Horizontal Cabling
2 1. Label each horizontal cable at Telecommunications Outlet and at horizontal cross-connect with
3 unique identifying code.
4 2. Cable shall be labeled at both ends within 4" of cable choke (end of jacket).
5 3. Horizontal labeling code shall be same as identified for Telecommunications Outlet above.
6 F. Modular Patch Panel
7 1. Label each patch panel and port at horizontal cross-connect with unique identifying code.
8 2. Patch panel labeling code shall be same as identified for Telecommunications Outlet above.
9 3. Room number is not required on modular patch panels.
10 4. Equipment Rack number is not required on modular patch panels.
11 G. Backbone Copper Cable
12 1. Label each backbone cable at both ends at termination point with unique identifying code.
13 2. Label cable sheath:
14 a. At point where sheath ends
15 b. At point on cable where viewing of label is not obscured by termination blocks or other visual
16 barrier.
17 3. Label shall be on plastic tag tie-wrapped to cable sheath, or placed on adhesive labels adhered to
18 cable sheath.
19 a. If adhesive labels are used, place clear plastic tape over label to protect it and maintain
20 adhesion to sheath.
21 4. Label Intra-building cables with:
22 a. From and to locations,
23 b. Pair numbers
24 1) Where multiple cables are installed between same end-points, labeling shall indicate
25 sequential pair numbering.
26 a) For example 400-pair provided as two 200-pair cables would be labeled "001-
27 200" and "201-400".
28 c. Date installed.
29 1) Example 200-pair cable from ER106 to TR3164 installed October 2019:
30

ER106-TR3164 001-200 10/2019

- 31 5. Label Inter-building (between buildings) cables with:
32 a. From and to locations,
33 b. Pair numbers
34 1) Where multiple cable is installed between same end-points, labeling shall indicate
35 sequential pair numbering.
36 a) For example 400-pair provided as two 200-pair cables would be labeled "001-
37 200" and "201-400".
38 c. Date installed.
39 1) Example 600-pair Cable from Building 108 ER to Building 110 ER installed October
40 2019:

ER180-ER110 001-600 10/2019

- 41 H. Termination Blocks
42 1. Provide color-coded designation strips with Termination Blocks.
43 2. Label termination positions on designation strips with position identifier.
44 3. Horizontal Cabling Blocks shall incorporate BLUE Designation Strips and shall identify:
45 a. Telecommunications Outlet / Jack I.D.s
46 4. Intra-Building (within building) Backbone Cabling Blocks shall incorporate WHITE Designation Strips.
47 a. Label Designation Strips with:
48 1) Cable Origin & Destination
49 a) Repeat on every designation strip.
50 2) Pair Count.
51 a) Label 1st and 25th Positions on each row (e.g. 001 & 025, 026 & 050, etc.).

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b. Example ER106 to TR3164:

001	ER106-TR3164	025
026	ER106-TR3164	050

5. Inter-Building (between buildings) Backbone Cabling Blocks shall incorporate BROWN Designation Strips.

a. Label Designation Strips with:

- 1) Origin, Cable & Destination
- 2) Repeat on every designation strip.
- 3) Pair Count
- a) Label 1st and 25th Positions on each row (e.g. 001 and 025, 026 and 050, etc.).

b. Example cable linking Building 123 ER and Bldg. 456ER:

001	123ER-456ER	025
026	123ER-456ER	050

6. Voice "Multiplier" Blocks shall incorporate YELLOW Designation Strips.

- a. Label each designation strip with "Multiplier"
- b. Label 25-pair rows in 100-pair multiplier block as "A" (1st 25-pair), "B" (2nd 25-pair), "C" and "D".
- c. Label Pair Count
- 1) Label 1st Block 001 - 025; label 2nd Block 025 - 050, etc.
- 2) Label 1st and 25th Positions on each row (e.g. 001 and 025, 026 and 050, etc.).
- d. Example:

A001	MULTIPLIER	A025
B001	MULTIPLIER	B025

C001	MULTIPLIER	C025
D001	MULTIPLIER	D025

7. Feed Blocks (from Access/Service Provider) shall incorporate GREEN Designation Strips.

- a. Label Designation Strips with:
 - 1) Designation as "FEED CABLE"
 - 2) Pair Count.
- b. Example (Verizon as Service Provider):

1201	FEED (VERIZON)	1225
1226	FEED (VERIZON)	1250

8. Telephone system Equipment Blocks shall incorporate PURPLE Designation Strips.

- a. Label Designation Strips with:
 - 1) Designation (e.g. System or Equipment Type)
 - 2) Pair Count.
- b. Example (PBX):

001	PBX	025
026	PBX	050

I. Backbone Fiber Optic Cabling

1. Label each backbone cable at both ends at termination point with unique identifying code.
2. Label shall be placed on adhesive labels adhered to cable sheath.
3. Label Intra-building cables with:
 - a. From and to locations,
 - b. Fiber type (core/cladding diameter)
 - c. Fiber count
 - 1) Where multiple cable is installed between same end-points, labeling shall indicate sequential fiber numbering.
 - a) For example 144-fibers provided as two 72-fiber cables would be labeled "001-072" and "073-144".
- d. Date installed.

- 1 e. Example 72-fiber cable from ER106 to TR3164 installed October 2019:

ER106-TR3164
50/125 001-072
10/2019

- 2 4. Label Inter-building cables with:
3 a. From and to locations,
4 b. Fiber type (core/cladding diameter)
5 c. Fiber count.
6 1) Where multiple cable is installed between same end-points, labeling shall indicate
7 sequential fiber numbering.
8 a) For example 144-fibers provided as two 72-fiber cables would be labeled "001-
9 072" and "073-144".
10 d. Date installed.
11 e. Example 72-fiber cable from Building 108 ER to Building 110 ER installed October 2019:

ER108-ER110
50/125 001-072
10/2019

12 J. Fiber Optic Patch Panels

- 13 1. Label each fiber coupling in patch panel or workstation outlet with unique identifying code.
14 2. Patch panel labels shall be visible from front of panel without opening panel cover.
15 3. Place labels in manufacturer designated labeling areas.
16 4. Label Fiber Optic Patch Panels with unique labeling code to identify:
17 a. [Cable Destination] [Cable Number]
18 b. Fiber type (core/cladding diameter)
19 c. Fiber (or coupler) number of each panel position.
20 1) Port I.D. shall be from Top to Bottom, Left to Right,
21 2) Manufacturers port labeling is acceptable.

22 K. Telecommunications Grounds

- 23 1. Label Grounds as close as practicable to point of termination.
24 2. Labels shall be non-metallic and include the following:

WARNING
IF THIS CONNECTOR OR CABLE IS
LOOSE OR MUST BE REMOVED,
PLEASE CALL THE BUILDING
TELECOMMUNICATIONS
MANAGER.

25 3.18 PAINTING

- 26 A. Refer to Section 270000 for information and requirements.

27 3.19 CLEANING AND REPAIR OF EXISTING MATERIALS

- 28 A. Refer to Section 270000 for information and requirements.

29 3.20 UTILITY SERVICES

- 30 A. Refer to Section 270000 for information and requirements.

31 3.21 CABLE AND CONDUCTOR PROTECTION

- 32 A. Refer to Section 270000 for information and requirements.

33 3.22 TESTING

- 34 A. Refer to Section 270000 for information and requirements.

35 3.23 START-UP

- 36 A. Refer to Section 270000 for information and requirements.

- 1 3.24 ATTIC STOCK
- 2 A. Refer to Section 270000 for information and requirements.

- 3 3.25 DOCUMENTATION
- 4 A. Refer to Section 270000 for information and requirements.

- 5 3.26 CLEANING
- 6 A. Refer to Section 270000 for information and requirements.

- 7 3.27 TRAINING
- 8 A. Refer to Section 270000 for information and requirements.

9 END OF SECTION

10

SECTION 27 10 00
STRUCTURED CABLING

- 1
- 2
- 3 PART 1 - GENERAL
- 4 1.1 SCOPE
- 5 1.2 DEFINITION
- 6 1.3 RELATED WORK
- 7 1.4 REQUIREMENTS OF REGULATORY AGENCIES
- 8 1.5 REFERENCES AND STANDARDS
- 9 1.6 ABBREVIATIONS AND ACRONYMS
- 10 1.7 DEFINITIONS
- 11 1.8 WORK BY OWNER
- 12 1.9 QUALITY ASSURANCE
- 13 1.10 SUBMITTALS
- 14 1.11 WARRANTY
- 15 PART 2 - PRODUCTS
- 16 2.1 GENERAL
- 17 2.2 LISTING
- 18 2.3 PRODUCT SUBSTITUTIONS
- 19 2.4 STRUCTURED CABLING PRODUCTS
- 20 PART 3 - EXECUTION
- 21 3.1 GENERAL
- 22 3.2 WORK SEQUENCE
- 23 3.3 TEMPORARY SERVICES
- 24 3.4 BUILDING ACCESS
- 25 3.5 DAMAGE
- 26 3.6 DEMOLITION
- 27 3.7 CONTINUITY OF SERVICES
- 28 3.8 DELIVERY, STORAGE, AND HANDLING
- 29 3.9 LOCATIONS OF WORK
- 30 3.10 CONCRETE WORK
- 31 3.11 HOUSEKEEPING PADS
- 32 3.12 CUTTING AND PATCHING
- 33 3.13 FLOOR, WALL, ROOF, AND CEILING PENETRATIONS
- 34 3.14 EQUIPMENT ACCESS
- 35 3.15 EQUIPMENT SUPPORTS
- 36 3.16 SUPPORT PROTECTION
- 37 3.17 INSTALLATION
- 38 3.18 PAINTING
- 39 3.19 CLEANING AND REPAIR OF EXISTING MATERIALS
- 40 3.20 UTILITY SERVICES
- 41 3.21 CABLE AND CONDUCTOR PROTECTION
- 42 3.22 TESTING
- 43 3.23 START-UP
- 44 3.24 ATTIC STOCK
- 45 3.25 DOCUMENTATION
- 46 3.26 CLEANING
- 47 3.27 TRAINING

48 PART 1 - GENERAL

- 49 1.1 SCOPE
- 50 A. This section details product and execution requirements for Structured Cabling for Communications
- 51 Systems.
- 52 1.2 DESCRIPTION
- 53 A. Refer to Section 27 0000 - General Communications Requirements for additional information and
- 54 requirements.
- 55 B. Structured cabling includes:
- 56 1. Cabling

- 1 2. Termination hardware
2 3. Grounding and bonding
- 3 **1.3 RELATED WORK**
- 4 A. Refer to Section 27-0000 - General Communications Requirements for additional information and
5 requirements.
6 B. Related Division 27 10 Sections include:
7 1. Section 27 1100 - Communications Equipment (Data Wiring)
8 2. Section 27 1500 - Communications Horizontal Cabling
- 9 **1.4 REQUIREMENTS OF REGULATORY AGENCIES**
- 10 A. Refer to Section 27 0000 - General Communications Requirements.
- 11 **1.5 REFERENCED STANDARDS**
- 12 A. Refer to Section 27 0000 - General Communications Requirements.
- 13 **1.6 ABBREVIATIONS AND ACRONYMS**
- 14 A. Refer to Section 27 0000 - General Communications Requirements.
- 15 **1.7 DEFINITIONS**
- 16 A. Refer to Section 27 0000 - General Communications Requirements.
- 17 **1.8 WORK BY OWNER**
- 18 A. Refer to Section 27 0000 - General Communications Requirements.
- 19 **1.9 QUALITY ASSURANCE**
- 20 A. Refer to Section 27 0000 - General Communications Requirements.
21 B. Contractor:
22 1. Manufacturer Certification:
23 a. Contractor shall be certified as an organization by the Manufacturer of the Structured Cabling
24 materials used and be an active participant in that Manufacturer's Installers Program for a
25 period of time commencing not less than one (1) year prior to Bid Date of this project and
26 extending through the completion of specified warranty periods, including certification
27 required to provide and support specified warranty.
28 b. Contractor's project manager, site superintendent, and foreman and field staff conducting
29 pathway and cable installation, cable termination, and testing shall, throughout the duration
30 of project work, hold current individual certification by the Manufacturer of the Structured
31 Cabling materials used.
32 2. BICSI Certified Staff:
33 a. Contractor shall have on staff a BICSI RCDD (Registered Communications Distribution
34 Designer) to act as Contractor's project manager for the project. RCDD shall:
35 1) Prior to submission, review Contractor's submittals for compliance with the contract
36 documents, and stamp each submittal with a current RCDD stamp indicating that they
37 have reviewed the prepared submittal and attest to its compliance.
38 2) Conduct field observations of Contractor's work on site once every two (2) weeks and
39 submit written field observation reports within five (5) working days of each
40 observation.
41 b. Contractor shall have on staff a certified BICSI Technician to act as Contractor's site
42 superintendent and foreman.
43 c. Contractor shall have on staff certified BICSI Technicians to perform testing and to supervise
44 and lead pathway installation and cable installation and termination operations.
45 d. Contractor shall have on staff certified BICSI Installers to perform cable installation and
46 termination operations.
- 47 **1.10 SUBMITTALS**
- 48 A. Refer to Section 27 0000 - General Communications Requirements for additional information and
49 requirements.
50 B. In addition, Submit:
51 1. Documentation demonstrating compliance with Manufacturer certification requirements for
52 Contractor and for Contractor's staff.

- 1 2. Documentation demonstrating compliance with BICSI certification requirements for Contractor's
2 staff.
- 3 1.11 **WARRANTY**
- 4 A. Refer to Section 27 0000 - General Communications Requirements for additional information and
5 requirements.
- 6 B. Warrant structured cable system as follows:
- 7 1. 4-pair Category-rated Horizontal Copper Permanent Link for no-less than 20 years from date of
8 substantial completion of work.
- 9 2. Fiber Optic Backbone for no-less than 20 years from date of substantial completion of work.
- 10 C. Warranty shall be direct from manufacturer of cabling and connecting components to Owner.

11 **PART 2 - PRODUCTS**

- 12 2.1 **GENERAL**
- 13 A. Refer to Section 27 0000 - General Communications Requirements for additional information and
14 requirements.
- 15 B. Cables and Termination hardware shall be technically compliant with referenced TIA documents.
- 16 2.2 **LISTING**
- 17 A. Refer to Section 27 0000 - General Communications Requirements.
- 18 2.3 **PRODUCT SUBSTITUTIONS**
- 19 A. Refer to Section 27 0000 - General Communications Requirements.
- 20 2.4 **STRUCTURED CABLING PRODUCTS**
- 21 A. Refer to technical sections.
- 22 B. All cable and connecting components that comprise the TIA horizontal cabling "Permanent Link" from
23 Horizontal Cross-connect to Telecommunications Outlet shall be compliant with the applicable requirements
24 for "DTE Power via the MDI" to provide at least 25.5W at the Powered Device as defined by the IEEE 802.3at
25 standard.
- 26 C. Products used in Communications Backbone Cabling, Communications Horizontal Cabling, and
27 Communications Connecting Cords, Devices, and Adapters shall be approved by the manufacturer as a
28 single System.

29 **PART 3 - EXECUTION**

- 30 3.1 **GENERAL**
- 31 A. Refer to Section 27 0000 - General Communications Requirements.
- 32 3.2 **WORK SEQUENCE**
- 33 A. Refer to Section 27 0000 - General Communications Requirements.
- 34 3.3 **TEMPORARY SERVICES**
- 35 A. Refer to Section 27 0000 - General Communications Requirements.
- 36 3.4 **BUILDING ACCESS**
- 37 A. Refer to Section 27 0000 - General Communications Requirements.
- 38 3.5 **DAMAGE**
- 39 A. Refer to Section 27 0000 - General Communications Requirements.
- 40 3.6 **DEMOLITION**
- 41 A. Refer to Section 27 0000 - General Communications Requirements.
- 42 3.7 **CONTINUITY OF SERVICES**
- 43 A. Refer to Section 27 0000 - General Communications Requirements.

- 1 3.8 DELIVERY, STORAGE AND HANDLING
2 A. Refer to Section 27 0000 - General Communications Requirements.
- 3 3.9 LOCATING FIELD WORK
4 A. Refer to Section 27 0000 - General Communications Requirements.
- 5 3.10 CONCRETE WORK
6 A. Refer to Section 27 0000 - General Communications Requirements.
- 7 3.11 HOUSEKEEPING PADS
8 A. Refer to Section 27 0000 - General Communications Requirements.
- 9 3.12 CUTTING AND PATCHING
10 A. Refer to Section 27 0000 - General Communications Requirements.
- 11 3.13 FLOOR, WALL, ROOF, AND CEILING FINISHES
12 A. Refer to Section 27 0000 - General Communications Requirements.
- 13 3.14 EQUIPMENT ACCESS
14 A. Refer to Section 27 0000 - General Communications Requirements.
- 15 3.15 EQUIPMENT SUPPORTS
16 A. Refer to Section 27 0000 - General Communications Requirements.
- 17 3.16 SUPPORT PROTECTION
18 A. Refer to Section 27 0000 - General Communications Requirements.
- 19 3.17 INSTALLATION
20 A. Refer to Section 27 0000 - General Communications Requirements.
21 B. Cable and Termination hardware shall be installed in accordance with referenced standards and guidelines,
22 industry best practices, and manufacturer's published instructions and recommended practices.
23 C. Cable
24 1. Maximum length of installed and terminated 4-pair Category-rated cable shall not exceed 290 feet
25 (90 m).
26 a. Includes slack required for installation and termination.
27 b. Contractor is responsible for installing cable to avoid unnecessarily long runs.
28 c. Any 4-pair Category-rated cable that can not be installed within above constraints shall be
29 identified and reported to Engineer prior to installation.
30 2. Maintain minimum cable bend radius of eight times outside diameter of twisted pair copper cables
31 and 20 times outside diameter of fiber optic cables during installation.
32 D. Termination
33 1. Terminate all cables in specified connector type.
34 2. Ground any metallic cable elements (if applicable) per Code.
35 E. Label cables and termination components per Section 27 0553 - Communications Systems Identification.
- 36 3.18 PAINTING
37 A. Refer to Section 27 0000 - General Communications Requirements.
- 38 3.19 CLEANING AND REPAIR OF EXISTING MATERIALS
39 A. Refer to Section 27 0000 - General Communications Requirements.
- 40 3.20 UTILITY SERVICES
41 A. Refer to Section 27 0000 - General Communications Requirements.
- 42 3.21 CABLE AND CONDUCTOR PROTECTION
43 A. Refer to Section 27 0000 - General Communications Requirements.

- 1 3.22 TESTING
2 A. General
3 1. Refer to Section 27 0000 - General Communications Requirements.
4 2. Test each cabling sub-system (e.g., backbone, horizontal, etc.) end-to-end.
5 3. Test instrument shall be configured using template for exact cable under test (e.g., by manufacturer
6 product designation).
7 a. If no template is available, enter cable parameters for the cable per manufacturer's product
8 data.
9 1) Nominal Velocity of Propagation (NVP) used for copper cable type under test shall be
10 traceable to manufacturers' product data.
11 2) Refractive Index used for fiber optic cable type under test shall be traceable to
12 manufacturers' product data.
13 b. Test results obtained using incorrect cable parameters will be rejected.
14 4. If any cable is found to be outside specification defined herein, identify and correct problem up to and
15 including replacement of cable and associated termination(s). Then repeat applicable tests.
16 5. Where sub-systems are to be interconnected or cross-connected by the contractor, test individual
17 sub-system followed by a test of the connected links
18 a. Performance and documentation requirements shall default to the lesser of the two connected
19 systems if different.
20 b. Example 1: Combined Backbone-Horizontal Link
21 1) Test and document individual Backbone and Horizontal Cabling Sub-systems.
22 2) Cross-connect sub-systems.
23 3) Repeat testing on combined cabling from MC - TO through HC.
24 4) Performance and documentation requirements shall be based in this example on
25 backbone cabling (continuity, pair integrity, etc.).
26 c. Example 2: Interconnected Zone Cabling Link
27 1) Test and document individual HC -- CP links.
28 2) Install interconnect cabling CP - TO
29 3) Repeat testing on combined cabling from HC - TO through CP.
30 4) Performance and documentation requirements shall be based in this example on TIA
31 Permanent Link for Horizontal Cabling.
32 B. Multipair Copper Cable, > 4-Pair
33 1. Verify voice cable pairs for wire map (transposed/reversed/split pairs) and shorts through toning of
34 each conductor.
35 2. Verify cable shield or coupled bonding conductor for end-to-end continuity.
36 C. 4-Pair Copper Cable
37 1. Testing shall be per TIA-568 Permanent Link test configurations.
38 2. Maximum length of station cable shall not exceed 300 ft.
39 3. Cables shall be free of shorts within pairs, and be verified for Continuity, Pair Validity and Polarity,
40 and Wire Map (Conductor Position on Modular Jack).
41 a. Identify and correct defective, split or mis-positioned pairs.
42 4. In addition to above, Performance Testing shall be performed on all cables. Testing of Transmission
43 Performance shall include the following:
44 a. Length
45 b. Insertion Loss / Attenuation
46 c. Pair-to-pair NEXT
47 d. PSNEXT
48 e. Pair-to-pair ELFEXT (Equal Level Far End Cross-talk)
49 f. PSEFEXT
50 g. Return Loss
51 h. Propagation Delay
52 i. Delay Skew
53 j. Alien Crosstalk (AXTalk)
54 1) AXTalk measurement method shall be as required by the manufacturer(s) of
55 cabling/connecting components installed to certify the system for warranty.
56 5. Test cables to maximum frequency defined by standards covering specified performance category.
57 6. Perform Transmission Performance Testing using test instrument designed for testing to specified
58 frequencies.
59 a. Test records shall verify "PASS" on each cable and display specified parameters - comparing
60 test values with standards based "templates" integral to unit.

- 1 D. Horizontal Fiber Optic Cable
2 1. Clean fiber optic connectors before beginning testing and after testing is completed.
3 a. Using fiber tester capabilities for fiber end face inspection is strongly encouraged to help minimize
4 requirement for re-testing due to dirty connectors.
5 2. Testing shall include:
6 a. Optical Attenuation
7 1) Light Source: LED
8 2) Measure Optical Attenuation on terminated fibers.
9 a) Include optical connectors and couplings installed at fiber endpoints.
10 3) Test single-mode fibers using EIA/TIA 526-7-1998, Method A.1.
11 4) Test all fibers in both transmission directions.
12 5) Test single-mode fibers at 1310 ± 10 nm and 1550 ± 10 nm wavelengths.
13 6) Fiber lengths less than or equal to 300 ft shall test to ≤ 2.0 dB loss.
14 7) Fiber lengths greater than 300 ft shall test to loss value less than link loss budget for
15 installed connectors and fibers.
16 3. Perform inspection with OTDR if end-to-end readings are higher than expected to determine source
17 of attenuation. Correct problem(s) and repeat Attenuation tests to ensure valid results within specified
18 limits are obtained.

19 3.23 **START-UP**
20 A. Refer to Section 27 0000 - General Communications Requirements.

21 3.24 **ATTIC STOCK**
22 A. Refer to Section 27 0000 - General Communications Requirements.

- 23 3.25 **DOCUMENTATION**
24 A. Refer to Section 27 0000 - General Communications Requirements.
25 B. Information added by Contractor to Record Drawings shall include:
26 1. Backbone and horizontal cable routes
27 2. Telecommunications outlet locations and identification
28 3. Other detail necessary to document cable installation
29 C. Backbone Cable
30 1. UTP Copper Cable
31 a. Document pair count assignments by cable.
32 2. Fiber Optic Cable
33 a. Files containing Attenuation and OTDR traces of individual optical fiber "signatures" shall be
34 so named as to identify each individual fiber by location in cable system and fiber number or
35 color.
36 b. OTDR test results shall be consistent in format and presentation, including:
37 1) Scale
38 a) Scale or window of test result view shall show only enough trace to view fiber
39 under test plus launch cords at both ends.
40 b) View shall not show backscatter beyond end of fiber.
41 2) Pulse width
42 3) Units (English or Metric)
43 4) Cursor placement
44 5) Identification

45 3.26 **CLEANING**
46 A. Refer to Section 27 0000 - General Communications Requirements.

- 47 3.27 **TRAINING**
48 A. Refer to Section 27 0000 - General Communications Requirements for additional information and
49 requirements.
50 B. Contractor shall provide to Owner's designated representative(s) a minimum of one (1) 4-hour on-site
51 training session related to work under this section within thirty (30) days of substantial completion.

52 **END OF SECTION**

53

SECTION 27 11 00

COMMUNICATIONS EQUIPMENT ROOM FITTINGS

- 1
2
3 PART 1 - GENERAL
4 1.1 SCOPE
5 1.2 DEFINITION
6 1.3 RELATED WORK
7 1.4 REQUIREMENTS OF REGULATORY AGENCIES
8 1.5 REFERENCES AND STANDARDS
9 1.6 ABBREVIATIONS AND ACRONYMS
10 1.7 DEFINITIONS
11 1.8 WORK BY OWNER
12 1.9 QUALITY ASSURANCE
13 1.10 SUBMITTALS
14 1.11 WARRANTY
15 PART 2 - PRODUCTS
16 2.1 GENERAL
17 2.2 LISTING
18 2.3 PRODUCT SUBSTITUTIONS
19 2.4 CABINETS, RACKS, FRAMES, AND ENCLOSURES
20 2.5 CABLE RUNWAY
21 2.6 TERMINATION BLOCKS
22 2.7 MODULAR PATCH PANELS
23 2.8 FIBER OPTIC PATCH PANELS
24 2.9 ENTRANCE PROTECTION
25 PART 3 - EXECUTION
26 3.1 GENERAL
27 3.2 WORK SEQUENCE
28 3.3 TEMPORARY SERVICES
29 3.4 BUILDING ACCESS
30 3.5 DAMAGE
31 3.6 DEMOLITION
32 3.7 CONTINUITY OF SERVICES
33 3.8 DELIVERY, STORAGE, AND HANDLING
34 3.9 LOCATIONS OF WORK
35 3.10 CONCRETE WORK
36 3.11 HOUSEKEEPING PADS
37 3.12 CUTTING AND PATCHING
38 3.13 FLOOR, WALL, ROOF, AND CEILING PENETRATIONS
39 3.14 EQUIPMENT ACCESS
40 3.15 EQUIPMENT SUPPORTS
41 3.16 SUPPORT PROTECTION
42 3.17 INSTALLATION
43 3.18 PAINTING
44 3.19 CLEANING AND REPAIR OF EXISTING MATERIALS
45 3.20 UTILITY SERVICES
46 3.21 CABLE AND CONDUCTOR PROTECTION
47 3.22 TESTING
48 3.23 START-UP
49 3.24 ATTIC STOCK
50 3.25 DOCUMENTATION
51 3.26 CLEANING
52 3.27 TRAINING

53 PART 1 - GENERAL

- 54 1.1 SCOPE
55 A. This section details product and execution requirements for Communications Equipment Room Fittings for
56 Communications Systems.

- 1 1.2 DESCRIPTION
- 2 A. Refer to Section 27 1000 - Structured Cabling.
- 3 B. Communications equipment room fittings include:
- 4 1. Racks, Frames and Enclosures
- 5 2. Cable Runway
- 6 3. Termination Blocks
- 7 4. Patch Panels
- 8 1.3 RELATED WORK
- 9 A. Refer to Section 27 1000 - Structured Cabling.
- 10 1.4 REQUIREMENTS OF REGULATORY AGENCIES
- 11 A. Refer to Section 27 1000 - Structured Cabling.
- 12 1.5 REFERENCES AND STANDARDS
- 13 A. Refer to Section 27 1000 - Structured Cabling.
- 14 1.6 ABBREVIATIONS AND ACRONYMS
- 15 A. Refer to Section 27 1000 - Structured Cabling.
- 16 1.7 DEFINITIONS
- 17 A. Refer to Section 27 1000 - Structured Cabling.
- 18 1.8 WORK BY OWNER
- 19 A. Refer to Section 27 1000 - Structured Cabling.
- 20 1.9 QUALITY ASSURANCE
- 21 A. Refer to Section 27 1000 - Structured Cabling.
- 22 1.10 SUBMITTALS
- 23 A. Refer to Section 27 1000 - Structured Cabling.
- 24 1.11 WARRANTY
- 25 A. Refer to Section 27 1000 - Structured Cabling.
- 26 PART 2 - PRODUCTS
- 27 2.1 GENERAL
- 28 A. Refer to Section 27 1000 - Structured Cabling.
- 29 2.2 LISTING
- 30 A. Refer to Section 27 1000 - Structured Cabling.
- 31 2.3 PRODUCT SUBSTITUTIONS
- 32 A. Refer to Section 27 1000 - Structured Cabling.
- 33 2.4 CABINETS, RACKS, FRAMES AND ENCLOSURES
- 34 A. Manufacturer: Commscope, Rittal, CPI, Ortronics, Wrightline, Panduit, Damac, IMS, Siemon
- 35 B. Equipment racks shall be:
- 36 1. Constructed of painted steel
- 37 2. Color Black
- 38 3. Configured with Channel uprights spaced to accommodate industry standard 19" mounting
- 39 4. Supplied with spare screws (minimum of 50)
- 40 C. Free Standing Equipment Rack shall comply with general requirements above and shall:
- 41 1. Be of a 2-post configuration
- 42 2. Be 84" in height
- 43 a. Have minimum of 45 usable rack mounting units (RU)
- 44 3. Be self-supporting

- 1 4. Have Minimum base footprint of 15" x 20"
- 2 5. Be double-sided drilled and tapped to accept 12-24 screws
- 3 a. Uprights shall be drilled on back to accept cable brackets, clamps, power strip(s).
- 4 b. Hole pattern on rack front and back shall be per EIA/TIA specifications (5/8" – 5/8" – 1/2").
- 5 D. Wall Mounted Equipment Rack shall comply with general requirements above and shall:
- 6 1. Be 36" in height
- 7 a. Have minimum 18 usable rack mounting units (RU)
- 8 2. Be minimum 22" deep from front face of vertical rails to wall behind
- 9 3. Be double-side drilled and tapped to accept 12-24 screws
- 10 a. Uprights shall be drilled on back to accept cable brackets, clamps, power strip(s).
- 11 b. Hole pattern on rack front and back shall be 5/8" – 5/8" – 1/2".
- 12 4. Include side-to-side filtered airflow vents with 120VAC powered intake fans.
- 13 E. Cable Management
- 14 1. Manufacturer: CommScope
- 15 2. Horizontal Cable Management Panels shall:
- 16 a. Be painted steel
- 17 b. Be 3.5" high
- 18 c. Have minimum of 5 distribution rings (3.75" x 3.75" minimum dimension)
- 19 1) Distribution rings shall be painted steel
- 20 d. Incorporate cable routing guides and supports on rear of panel.
- 21 3. Vertical Cable Management shall:
- 22 a. Provide for cable routing on front and rear of each rack
- 23 b. Be 12" wide.
- 24 c. Incorporate cable slack spools.
- 25 d. Mount on spacers attached to rack uprights and not on upright
- 26 e. Be accessible from front and rear of rack
- 27 f. Be designed to space slots/fingers at 1 RU intervals to align with rack-mounted equipment

28 **2.5 CABLE RUNWAY**

- 29 A. Manufacturers: CPI, B-Line
- 30 B. Cable Runway shall:
- 31 1. Be constructed of 0.065" thick steel
- 32 2. Utilize tubular stringers to support rungs.
- 33 a. Stringers shall be 1-1/2" high.
- 34 b. Rungs shall be welded to stringers and shall be spaced 9" on center.
- 35 3. Be painted with black epoxy.
- 36 C. Runway width(s) shall be as shown on drawings.

37 **2.6 TERMINATION BLOCKS**

- 38 A. Manufacturers: CommScope
- 39 B. Blocks shall be 110-style high-density cross-connect blocks.
- 40 C. Each horizontal row of block shall be capable of terminating one 25 pair binder group of Backbone Copper
- 41 Cable, or six 4 pair Copper Cables.
- 42 D. Mechanical termination on blocks shall:
- 43 1. Have ability to terminate 22-26 AWG plastic insulated, solid and stranded copper conductors.
- 44 2. Provide direct connection between horizontal or backbone cable and jumper wires.
- 45 3. Be designed to maintain cable pair twists as closely as possible to point of mechanical termination.
- 46 E. Blocks for Horizontal Cabling shall use 4-pair connecting blocks; blocks for backbone cabling shall use 5-
- 47 pair connecting blocks.
- 48 1. Blocks shall identify pair position by color designation.
- 49 a. Colors shall be Blue, Orange, Green and Brown for Horizontal Cables.
- 50 b. Colors shall be Blue, Orange, Green, Brown and Slate for Backbone Cables.
- 51 c. Markings shall designate Tip and Ring conductors.
- 52 2. Terminate up to 300-pairs (each block)
- 53 F. Wall Mounted Voice Blocks shall:
- 54 1. Be equipped with legs
- 55 2. Meet or exceed TIA Category 3 performance criteria
- 56 3. Terminate up to 300 pairs (each block)
- 57 G. Rack Mounted Voice Blocks shall:
- 58 1. Be rack-mounted with no legs
- 59 2. Meet or exceed TIA Category 3 performance criteria

- 1 3. Terminate up to 200 pairs (each block)
- 2 H. Horizontal Cable Managers (Jumper Troughs) designed for use with blocks shall be:
- 3 1. Manufactured with high-strength, flame-retardant thermoplastic
- 4 2. Designed for easy cable insertion or withdrawal
- 5 3. 2 RUs high
- 6 4. Rack- or wall-mountable (with legs) to match block configuration
- 7 I. Vertical Cable Managers for wall-mounted Termination Blocks shall utilize distributing rings.
- 8 1. Rings shall be metal and be split to facilitate passage of jumper wires.
- 9 2. Minimum Dimension of each ring shall be 5" square.
- 10 2.7 MODULAR PATCH PANELS
- 11 A. Manufacturers: CommScope, Siemon, Ortronics, Panduit
- 12 B. Panels shall:
- 13 1. Consist of Modular-to-IDC connector system
- 14 2. Be rack-mountable in standard EIA 19" equipment racks
- 15 3. Be 2 RUs high
- 16 4. Accommodate 48-port modular jacks in two rows of 24-ports
- 17 5. Be designed to terminate 4-pair, 100-Ohm UTP cables
- 18 6. Have ability to terminate 22-26 AWG plastic insulated, solid and stranded copper conductors.
- 19 7. Be designed to maintain cable's pair twists as closely as possible to point of mechanical termination.
- 20 8. Have cable support and strain relief devices to secure cables at IDC connector.
- 21 a. Panel and cable support hardware shall ensure that cabling minimum bend radius
- 22 requirements are satisfied.
- 23 9. Have port identification numbers on both front and rear of panel.
- 24 10. Have color-coded pair designations on rear of panel.
- 25 C. Modular Jacks in Panel shall:
- 26 1. Be non-keyed, 8 position, 8-conductor (8P8C)
- 27 D. Panels shall meet or exceed TIA Category 6A performance criteria.
- 28 2.8 FIBER OPTIC PATCH PANELS
- 29 A. Manufacturers: CommScope, Corning, Siemon, Panduit or Ortronics.
- 30 B. Patch Panels shall:
- 31 1. Be enclosed assemblies
- 32 2. Incorporate hinged or retractable front cover
- 33 3. Be rack mountable on standard TIA 19" equipment racks
- 34 4. Provide for strain relief of incoming cables
- 35 5. Incorporate radius control mechanisms to limit bending of fiber to manufacturer's recommended
- 36 minimums of 1.2", whichever is larger
- 37 6. Provide protection to both "facilities" and "user" sides of couplings.
- 38 7. Be configured to require only front access when patching
- 39 8. Incorporate patch cable routing space internal to patch panel enclosure.
- 40 a. Routing space shall be front-accessible.
- 41 9. Include provisions for permanent labeling of fiber optic cables.
- 42 a. Labeling shall be accessible from front of patch panel and shall not require disassembly of
- 43 patch panel enclosure or removal of front cover.
- 44 C. Couplings shall be mounted on assembly that snaps into patch panel enclosure.
- 45 1. This assembly shall be designed to accept variety of coupler types including, ST, SC, duplex SC and
- 46 high-density mini-connectors.
- 47 2. Coupling type shall be duplex LC
- 48 D. Access to inside of panel enclosure during installation shall be from front and rear.
- 49 1. Panels that require disassembly of cabinet to gain entry will not be accepted.
- 50 E. Incoming cables shall not be accessible from patching area of panel.
- 51 1. Enclosure shall provide physical barrier to access of such cables.
- 52 2. Where factory-terminated cable assemblies ("pigtailed") are spliced to cable, enclosure shall
- 53 incorporate hardware for securing of splice tray and required cable, buffer tube and pigtail slack.
- 54 2.9 ENTRANCE PROTECTION
- 55 A. By Telecommunications Service Providers

1 **PART 3 - EXECUTION**

2 3.1 **GENERAL**

3 A. Refer to Section 27 1000 - Structured Cabling.

4 3.2 **WORK SEQUENCE**

5 A. Refer to Section 27 1000 - Structured Cabling.

6 3.3 **TEMPORARY SERVICES**

7 A. Refer to Section 27 1000 - Structured Cabling.

8 3.4 **BUILDING ACCESS**

9 A. Refer to Section 27 1000 - Structured Cabling.

10 3.5 **DAMAGE**

11 A. Refer to Section 27 1000 - Structured Cabling.

12 3.6 **DEMOLITION**

13 A. Refer to Section 27 1000 - Structured Cabling.

14 3.7 **CONTINUITY OF SERVICES**

15 A. Refer to Section 27 1000 - Structured Cabling.

16 3.8 **DELIVERY, STORAGE, AND HANDLING**

17 A. Refer to Section 27 1000 - Structured Cabling.

18 3.9 **LOCATIONS OF WORK**

19 A. Refer to Section 27 1000 - Structured Cabling.

20 3.10 **CONCRETE WORK**

21 A. Refer to Section 27 1000 - Structured Cabling.

22 3.11 **HOUSEKEEPING PADS**

23 A. Refer to Section 27 1000 - Structured Cabling.

24 3.12 **CUTTING AND PATCHING**

25 A. Refer to Section 27 1000 - Structured Cabling.

26 3.13 **FLOOR, WALL, ROOF, AND CEILING OPENINGS**

27 A. Refer to Section 27 1000 - Structured Cabling.

28 3.14 **EQUIPMENT ACCESS**

29 A. Refer to Section 27 1000 - Structured Cabling.

30 3.15 **EQUIPMENT SUPPORTS**

31 A. Refer to Section 27 1000 - Structured Cabling.

32 3.16 **SUPPORT PROTECTION**

33 A. Refer to Section 27 1000 - Structured Cabling.

34 3.17 **INSTALLATION**

35 A. **GENERAL**

36 1. Refer to Section 27 1000 - Structured Cabling.

37 2. Refer to project Drawings for communications equipment room layout and equipment placement.

38 3. Communications equipment room doors must be closed during termination and testing if area outside
39 room is not broom clean and free of debris, dirt, dust, moisture, foreign materials, etc.

- 1 4. Provide necessary assistance to allow Owner or Carrier personnel to establish service on new cable
2 system.
- 3 a. Includes general wiring overview, cable pair identification, and cross connect documentation
4 (if applicable).
- 5 B. EQUIPMENT RACKS AND CABLE MANAGEMENT
- 6 1. Provide equipment racks as shown on project Drawings.
- 7 2. Assemble racks per manufacturer's recommendations. Remove paint at the point(s) of contact of
8 assembly hardware or use internal-external tooth lock washers to pierce paint to maintain ground
9 continuity.
- 10 3. Bolt racks to floor.
- 11 4. Secure racks to cable runway as described below.
- 12 5. Provide Horizontal and Vertical Cable Management in equipment racks per project Drawings.
- 13 6. Bond each rack mounted ground bar to telecommunications ground bus bar (TGB).
14 a. Use #6 AWG or larger copper conductor (green jacket).
- 15 C. CABLE RUNWAY
- 16 1. Provide cable runway and accessories necessary for complete system.
- 17 2. Size and layout of cable runway shall be as shown on project Drawings.
- 18 3. Install 6" above equipment racks.
- 19 4. Align with equipment racks as shown on drawings.
- 20 5. Brace to racks with support brackets made by runway or rack manufacturer intended for this purpose.
21 Use radius drops where cables drop from tray to rack and at elevation changes.
- 22 7. Maximum allowable deviation of runway from level horizontal plane measured across length of cable
23 runway shall be 1/2", with tray loaded to capacity.
- 24 8. Where cable runway is supported from building structure:
25 a. Provide 3/8" threaded rods for support of 12" wide or smaller runway.
26 b. Provide 1/2" threaded rods for support of runway greater than 12" in width.
- 27 9. Bond runway components together using manufacturer's standard accessories.
- 28 10. Fasten cables to runway at intervals not to exceed 4 ft.
- 29 D. TERMINATION BLOCKS
- 30 1. Provide blocks to accommodate an additional 100% growth at each location.
- 31 2. Terminate Backbone Voice Cables on termination blocks.
32 a. Strip lengths & termination of all cabling to be per manufacturers recommendations.
- 33 3. Provide 110 blocks as follows:
34 a. Backbone Voice Cabling at main cross-connect on free-standing equipment racks and in wall-
35 mounted patch field.
- 36 4. Install Blocks:
37 a. No higher than 72" AFF to top-most block
38 b. Top to bottom, left to right beginning no closer than 12" from left wall
- 39 5. Provide horizontal troughs between each termination block.
- 40 6. Provide horizontal troughs at top of each block column.
- 41 7. Provide vertical managers to right and left of each block column.
- 42 8. Cabling entering and exiting fields shall be neatly laced, dressed and supported.
- 43 9. Contractor shall not be responsible for jumper wiring between horizontal and backbone cabling.
- 44 E. MODULAR PATCH PANELS
- 45 1. Provide panels to accommodate an additional 50% growth at each location.
- 46 2. Mount patch panels in 19" equipment racks.
- 47 3. Position cables in sequence of:
48 a. Telecommunications Outlet ID for horizontal cabling
49 b. Pair number for backbone cabling
- 50 4. Terminate cables using 568B wiring standard.
- 51 5. Secure each patch panel onto rack with minimum of 4 screws.
- 52 F. FIBER OPTIC PATCH PANELS
- 53 1. Provide Fiber Optic Patch Panels and coupling assemblies as shown on drawings.
54 a. Secure each patch panel onto rack with minimum of 4 screws.
- 55 2. Provide couplings in coupling assemblies and mount coupling assemblies and blank covers in patch
56 panels.
- 57 3. Position fibers consecutively - starting with lowest number - and mapped "position for position"
58 between patch panels.
59 a. There shall be no transpositions in cabling.
- 60 4. Provide blank covers for unused coupling assembly spaces in panels.
- 61 5. Clean couplings prior to connector insertion.
- 62 6. Provide dust caps for couplings.

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- 1 B. CommScope 4-pair horizontal cabling connects horizontal or intermediate cross-connect (typically at Telecom
2 Room) and Telecommunications Outlet and includes:
3 1. 4-pair Copper Unshielded Twisted Pair (UTP)
4 2. Fiber Optic

5 **RELATED WORK**

- 6 A. Refer to Section 27 1000 - Structured Cabling.

7 **1.4 REQUIREMENTS OF REGULATORY AGENCIES**

- 8 A. Refer to Section 27 1000 - Structured Cabling.

9 **1.5 REFERENCES AND STANDARDS**

- 10 A. Refer to Section 27 1000 - Structured Cabling.

11 **1.6 ABBREVIATIONS AND ACRONYMS**

- 12 A. Refer to Section 27 1000 - Structured Cabling.

13 **1.7 DEFINITIONS**

- 14 A. Refer to Section 27 1000 - Structured Cabling.

- 15 B. In this section, "Telecommunications Outlet" is considered to consist of:

- 16 1. Frame/Faceplate into which Modular Jacks or other couplings snap
17 2. Modular Jacks
18 3. Blanks fitted to unused jack positions
19 4. Labeling/identification components

20 **1.8 WORK BY OWNER**

- 21 A. Refer to Section 27 1000 - Structured Cabling.

22 **1.9 QUALITY ASSURANCE**

- 23 A. Refer to Section 27 1000 - Structured Cabling.

24 **1.10 SUBMITTALS**

- 25 A. Refer to Section 27 1000 - Structured Cabling.

26 **1.11 WARRANTY**

- 27 A. Refer to Section 27 1000 - Structured Cabling.

28 **PART 2 - PRODUCTS**

29 **2.1 GENERAL**

- 30 A. Refer to Section 27 1000 - Structured Cabling.

- 31 B. Horizontal (Station) Cable and Termination Components (Jack, Patch Panel) are specified to function as
32 System.

- 33 1. Where required for warranty purposes, manufacturers of cabling and termination components used
34 (if more than one) shall recognize each other in their Certification Programs.

- 35 C. 4-Pair Horizontal Copper Cables and Modular Jacks are application independent (e.g. no distinction between
36 "voice" and "data").

37 **2.2 LISTING**

- 38 A. Refer to Section 27 1000 - Structured Cabling.

39 **2.3 PRODUCT SUBSTITUTIONS**

- 40 A. Refer to Section 27 1000 - Structured Cabling.

41 **2.4 4-PAIR HORIZONTAL COPPER CABLE**

- 42 A. Manufacturers: CommScope, Siemon, Panduit or Berk-Tek

- 43 B. Cables shall be suitable for installation in environment defined

- 44 C. Cabling shall be packaged to minimize tangling and kinking of cable during installation.

- 1 2) Designation strips shall be fitted with clear plastic covers.
2 3) Designation strips and covers shall be positioned over faceplate mounting screws.
3
4 2. Faceplate Color: to match electrical device faceplates.
5 D. Wall-mount Telephones Faceplate
6 1. Faceplates intended to be used in locations where wall mounted telephone set is required shall:
7 a. Be stainless steel construction.
8 b. Accommodate 1 modular jack meeting performance requirements for jack as defined above.
9 1) Modular jack shall be positioned to mate with wall-mounted telephone.
10 c. Mount on standard single gang opening.
11 d. Include mating lugs for mounting wall-mounted telephone.
12 E. Faceplate - Wireless Access Point Location
13 1. Faceplates supporting Wireless Access Point (AP) shall:
14 a. Accept 2 modular jacks or connectors.
15 b. Be mounted in an enclosure designed for AP.
16 c. Be made of High Impact thermoplastic.
17 d. Incorporate recessed designation strips at top and bottom of frame for identifying labels.
18 2. Faceplate Color: to match electrical device faceplates.
19 F. Faceplate - Surface Raceway
20 1. Faceplates intended to be used on surface raceway shall:
21 a. Accept 4 modular jacks or connectors.
22 b. Snap into raceway opening and be retained by integral latching tabs.
23 1) Match standard opening of raceway type(s) to be installed.
24 c. Have an optional extender bracket available to increase mounting depth.
25 d. Be made of High Impact thermoplastic.
26 e. Incorporate recessed designation strips for identifying labels.
27 1) Raceway faceplate color shall be match color of raceway.
28 G. Faceplate - Modular Furniture
29 1. Faceplates intended to be used on modular furniture shall:
30 a. Accept 4 modular jacks or connectors.
31 b. Snap into modular furniture opening and be retained by integral latching tabs.
32 c. Match standard opening of furniture type(s) to be installed.
33 d. Have an optional extender bracket available to increase mounting depth as required to
34 maintain cable bend radius within manufacturers' recommendations.
35 e. Be made of High Impact thermoplastic.
36 f. Incorporate recessed designation strips for identifying labels.
37 1) Modular furniture faceplate color shall be match color of furniture panel.
38 H. Faceplate - Industrial
39 1. Faceplates used in areas requiring a rugged, dust & water-tight assembly as identified on Project
40 drawings shall:
41 a. Accept 2 modular jacks or connectors.
42 b. Be configured to mount on standard, single gang opening when wall mounted.
43 c. Be designed for industrial application.
44 d. Meet IP67 sealing requirements.
45 e. Incorporate recessed designation strips at top and bottom of frame for identifying labels.
46 2. Housing holding modular jack(s) shall be designed to mate with patch cord plug having bayonet-type
47 twist mount.
48 3. Faceplate material shall be Stainless Steel.
49 4. Telecommunications Outlet shall be equipped with dust cap to protect unused outlets or to seal an
50 outlet during cleaning periods when outlet and plug may be disconnected.
51 a. Dust cap shall be constructed of industrial grade thermoplastic.
b. Dust cap shall include tether which prevents them from being misplaced when not in use.

52 2.7 MODULAR JACK

- 53 A. Manufacturers: Refer to "Telecommunications Outlet" above.
54 B. Modular Jacks shall be:
55 1. 8-position, 8-conductor (8P8C)
56 2. Non-keyed
57 C. Jacks shall have an attached color-coded wiring instruction label as an aid to installer.
58 D. Interface between jack and station cable shall be insulation displacement type contact.
59 E. Termination components shall maintain cable's pair twists as closely as possible to point of mechanical
60 termination.

- 1 3.10 CONCRETE WORK
2 A. Refer to Section 27 1000 - Structured Cabling.
- 3 3.11 HOUSEKEEPING PADS
4 A. Refer to Section 27 1000 - Structured Cabling.
- 5 3.12 CUTTING AND PATCHING
6 A. Refer to Section 27 1000 - Structured Cabling.
- 7 3.13 FLOOR, WALL, ROOF, AND CEILING OPENINGS
8 A. Refer to Section 27 1000 - Structured Cabling.
- 9 3.14 EQUIPMENT ACCESS
10 A. Refer to Section 27 1000 - Structured Cabling.
- 11 3.15 EQUIPMENT SUPPORTS
12 A. Refer to Section 27 1000 - Structured Cabling.
- 13 3.16 SUPPORT PROTECTION
14 A. Refer to Section 27 1000 - Structured Cabling.
- 15 3.17 INSTALLATION
16 A. Refer to Section Section 27 1000 - Structured Cabling.
17 B. GENERAL
18 1. Refer to project Drawings for outlet locations.
19 C. CABLE INSTALLATION AND TERMINATION
20 1. General
21 a. Provide specified cable type(s) between Horizontal Cross-connect (HC) (typically at
22 Telecommunications Room) and Telecommunications Outlet.
23 b. Provide "Service Loop" for every horizontal cable in ceiling above outlet.
24 1) Loop length shall be 3.3 ft
25 2) Total length of 4-pair Category-rated horizontal cable including loop shall not exceed
26 290 feet (90 m).
27 3) Place loop in ceiling at last support (e.g. J-Hook) before cables enter fishable wall,
28 conduit, surface raceway or box.
29 4) Coil loop in figure 8 configuration.
30 5) Loop radius (minimum) shall be 4X minimum bend radius for cable.
31 c. Terminate cables with specified connectors at HC and Telecommunications Outlet.
32 2. Twisted-Pair Copper Cabling
33 a. At Telecommunications Outlet, terminate each 4-pair Horizontal Cable on dedicated 8P8C
34 Modular Jack.
35 1) Terminating one cable on more than one jack is not allowed.
36 b. At horizontal cross-connect, terminate:
37 1) Each 4-pair cable on 8P8C Modular Jack in Patch Panel.
38 c. Terminate cables using 568B wiring standard.
39 d. Cable jacket shall be continuous to within 1/2" of termination.
40 e. Preserve pair twists to point of termination.
41 f. Refer to Section 27 1100 - Communications Equipment Room Fittings for termination
42 instructions for Modular Patch Panel and Termination Block.
43 3. Horizontal Fiber Optic Cable
44 a. Cable termination shall carry fiber buffer into connector strain relief mechanism.
45 b. Mount connectors in fiber patch panels at horizontal cross-connect as shown on drawings.
46 c. Refer to Section 27 1100 - Communications Equipment Room Fittings for termination
47 instructions.
48 D. TELECOMMUNICATIONS OUTLET
49 1. Provide Modular Jacks, Coaxial couplings (if applicable) and Fiber Optic couplings (if applicable) in
50 faceplates to provide connectivity as required by location as shown on Project Documents. Refer to
51 Project Drawings.
52 a. Unless noted otherwise, provide 1 faceplate per Telecommunications Outlet symbol shown
53 on Project Documents.



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1 B. The system shall include physical coordination, electrical coordination, pathway design, Authority Having
2 Jurisdiction coordination and approval, and Owner approval.

3 **1.2 DESCRIPTION**

4 A. Refer to Section 27 0000 - General Communications Requirements.

5 B. Complete, turnkey Emergency Communications System compliant with all applicable codes and standards
6 referenced herein and as indicated on drawings.

7 C. The Emergency Communications System shall include the following major components:

- 8 1. Emergency Communications Call Stations
- 9 2. Emergency Communications Master Stations
- 10 3. Emergency Communications Power Supplies

11 **1.3 RELATED WORK**

12 A. Refer to Section 27 0000 - General Communications Requirements.

13 **1.4 REQUIREMENTS OF REGULATORY AGENCIES**

14 A. Refer to Section 27 0000 - General Communications Requirements.

15 **1.5 REFERENCES AND STANDARDS**

16 A. Refer to Section 27 0000 - General Communications Requirements.

17 B. Design, cable and component selection, and installation practices shall conform with following:

- 18 1. ICC International Building Code
- 19 2. NFPA 70 - National Electrical Code
- 20 3. NFPA 72 - National Fire Alarm and Signaling Code
- 21 4. NFPA 101 - Life Safety Code

22 **1.6 ABBREVIATIONS AND ACRONYMS**

23 A. Refer to Section 27 0000 - General Communications Requirements.

24 **1.7 DEFINITIONS**

25 A. Refer to Section 27 0000 - General Communications Requirements.

26 **1.8 WORK BY OWNER**

27 A. Refer to Section 27 0000 - General Communications Requirements.

28 **1.9 QUALITY ASSURANCE**

29 A. Refer to Section 27 0000 - General Communications Requirements.

30 **1.10 SUBMITTALS**

31 A. Refer to Section 27 0000 - General Communications Requirements.

32 **1.11 WARRANTY**

33 A. Refer to Section 27 0000 - General Communications Requirements.

34 **PART 2 - PRODUCTS**

35 **2.1 GENERAL**

36 A. Refer to Section 27 0000 - General Communications Requirements.

37 **2.2 LISTING**

38 A. Refer to Section 27 0000 - General Communications Requirements.

39 **2.3 PRODUCT SUBSTITUTIONS**

40 A. Refer to Section 27 0000 - General Communications Requirements.

41 **2.4 EMERGENCY COMMUNICATIONS CALL STATIONS**

42 A. Features:

- 43 1. Flush wall-mounted

- 1 C. Boxes:
2 1. Minimum 4" square 2-1/8" deep.
- 3 **2.10 EMERGENCY COMMUNICATION CABLE TRAYS**
4 A. Refer to 270533 for information and requirements.
- 5 **2.11 EMERGENCY COMMUNICATION SURFACE RISEWAYS**
6 A. Refer to 270533 for additional information and requirements.
7 B. Minimum capacity equivalent to 3/4" trade size conduit.
- 8 **PART 3 - COMMUNICATIONS**
- 9 **3.1 GENERAL**
10 A. Refer to Section 27 0000 - General Communications Requirements.
- 11 **3.2 WORK SEQUENCE**
12 A. Refer to Section 27 0000 - General Communications Requirements.
- 13 **3.3 TEMPORARY SERVICES**
14 A. Refer to Section 27 0000 - General Communications Requirements.
- 15 **3.4 BUILDING ACCESS**
16 A. Refer to Section 27 0000 - General Communications Requirements.
- 17 **3.5 DAMAGE**
18 A. Refer to Section 27 0000 - General Communications Requirements.
- 19 **3.6 DEMOLITION**
20 A. Refer to Section 27 0000 - General Communications Requirements.
- 21 **3.7 CONTINUITY OF SERVICES**
22 A. Refer to Section 27 0000 - General Communications Requirements.
- 23 **3.8 DELIVERY, STORAGE, AND HANDLING**
24 A. Refer to Section 27 0000 - General Communications Requirements.
- 25 **3.9 LOCATIONS OF WORK**
26 A. Refer to Section 27 0000 - General Communications Requirements.
- 27 **3.10 CONCRETE WORK**
28 A. Refer to Section 27 0000 - General Communications Requirements.
- 29 **3.11 HOUSEKEEPING PADS**
30 A. Refer to Section 27 0000 - General Communications Requirements.
- 31 **3.12 CUTTING AND PATCHING**
32 A. Refer to Section 27 0000 - General Communications Requirements.
- 33 **3.13 FLOOR, WALL, ROOF, AND CEILING OPENINGS**
34 A. Refer to Section 27 0000 - General Communications Requirements.
- 35 **3.14 EQUIPMENT ACCESS**
36 A. Refer to Section 27 0000 - General Communications Requirements.
- 37 **3.15 EQUIPMENT SUPPORTS**
38 A. Refer to Section 27 0000 - General Communications Requirements.

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- 1 3.25 DOCUMENTATION
2 A. Refer to Section 27 0000 - General Communications Requirements.
- 3 3.26 CLEANING
4 A. Refer to Section 27 0000 - General Communications Requirements.
- 5 3.27 TRAINING
6 A. Refer to Section 27 0000 - General Communications Requirements.
7 B. Contractor shall provide to Owner's designated representative(s) a minimum of one (1) 1-hour on-site
8 training session related to work under this section within thirty (30) days of substantial completion.

9 END OF SECTION
10

- 1 2. Surge Protection
- 2 3. Bi-Directional Amplifier / Repeater
- 3 4. Splitters
- 4 5. Directional Couplers / Taps
- 5 6. Coverage Antennas
- 6 7. Uninterruptible Power Supplies
- 7 8. Enclosures
- 8 9. Cable raceways
- 9 10. RF Engineering
- 10 11. Coordination plans and drawings.
- 11 12. AHJ Approvals

12 **1.3 RELATED WORK**

- 13 A. Refer to Section 270000 for additional information and requirements.

14 **1.4 REQUIREMENTS OF REGULATORY AGENCIES**

- 15 A. NFPA 70-2013
- 16 B. Refer to Section 27 0000 for additional requirements.

17 **1.5 REFERENCES AND STANDARDS**

- 18 A. Refer to Section 270000 for additional information and requirements.
- 19 B. Other applicable references and standards include:
- 20 1. United States Table of Frequency Allocations, current version
 - 21 2. Federal Communications Commission Table of Frequency Allocations, current version
 - 22 3. FCC OET Bulletin 65

23 **1.6 DEFINITIONS**

- 24 A. Refer to Section 270000 for additional information and requirements.
- 25 B. Active: DAS components that require AC/DC power for operation
- 26 C. Channel: A path for an RF transmission between two points
- 27 D. Component: A main system element of the ERRCS
- 28 E. Contractor: The prime contractor bidding the project
- 29 F. Passive: ERRCS components that do not require AC/DC power for operation

30 **1.7 ABBREVIATIONS AND ACRONYMS**

- 31 A. ACG: Automatic Gain Control
- 32 B. AHJ: Authority Having Jurisdiction
- 33 C. ATP: Acceptance Test Plan
- 34 D. AWS: Advanced Wireless Service
- 35 E. BDA: Bi-Direction Amplifier
- 36 F. BOM: Bill-of-Material
- 37 G. BRS: Broadband Radio Service
- 38 H. C/N: Carrier-to-Noise Ratio
- 39 I. DAQ: Delivered Audio Quality
- 40 J. EBS: Educational Broadband Service
- 41 K. ESMR: Enhanced Specialized Mobile Radio
- 42 L. FCC: Federal Communications Commission
- 43 M. GUI: Graphical User Interface
- 44 N. LMR: Land Mobile Radio
- 45 O. MTBF: Mean Time Between Failure
- 46 P. NFPA: National Fire Protection Association
- 47 Q. NMS: Network Management System
- 48 R. NTIA: National Telecommunications and Information Administration
- 49 S. PSE: Public Safety Entity
- 50 T. PSN: Public Safety Network
- 51 U. RoF: Radio-over-Fiber
- 52 V. RoHS: Restriction of Hazardous Substances
- 53 W. RSL: Received Signal Level
- 54 X. RX: Receive
- 55 Y. SISO: Single-Input, Single-Output
- 56 Z. SMR: Specialized Mobile Radio

Common Name / Service	Uplink/Tx, MHz	Downlink/Rx, MHz
VHF / Public Safety	136-174	
UHF / Public Safety	380-512	
TETRA / Public Safety	450-455, 455-460	460-465, 465-470
700 MHz Public Safety	788-793	758-763
USMH / Public Safety	793-805	763-775
800 MHz Public Safety	809-824	854-869
iDEN / Public Safety	806-824, 896-902	851-869, 935-941

- 1 E. The system shall be capable of receiving approval of the PSN Authority Having Jurisdiction (AHJ).
- 2 F. The system shall provide uniform coverage with a minimum received signal level (RSL) of -80 dBm or 0
3 dBm higher than specified, whichever is higher, for all frequencies supported, throughout the
4 coverage area.
- 5 G. The system shall not interfere with the operation of other electronic systems.
- 6 H. The system shall include filtering of all frequencies unused by PSN signals in the area in which the project
7 is located.
- 8 I. The system shall be capable of upgrade, without the need for additional hardware or software, to support
9 changes to other frequencies within the deployed frequency bands in order to maintain PSN coverage as
10 originally designed.
- 11 J. The system shall be expandable to extend coverage for all frequencies supported to future new additions
12 without the need for additional head end equipment.
- 13 K. All passive system components shall be:
- 14 1. Broadband
- 15 2. PIM (passive intermodulation) compliant
- 16 2.2 PRODUCT SUBSTITUTIONS
- 17 A. Refer to Section 270000 for additional information and requirements.

18 **PART 3 - EXECUTION**

19 3.1 **CONFIGURATION COORDINATION MEETING**

- 20 A. Prior to the commencement of Contractor's design work, Contractor shall arrange and conduct a
21 configuration coordination meeting to review and coordinate all aspects of ERRCS device and equipment
22 configuration.
- 23 1. At a minimum, attendees shall include:
- 24 a. Owner's project manager and information technology / information systems representative
- 25 b. Division 27 project manager and site superintendent / field foreman
- 26 c. ERRCS subcontractor/supplier project manager
- 27 2. At a minimum, meeting agenda topics shall include:
- 28 a. Confirmation of all areas requiring coverage
- 29 b. Configuration of PSNs to be supported.
- 30 c. Identification and discussion of the proposed system's functional capabilities and limitations
- 31 d. Step-by-step review of system deployment execution plan.
- 32 e. Review of survey, design, installation, configuration, programming, and testing schedule and
33 of how those relate to the overall construction schedule, including identification of
34 interdependencies, project milestones, and critical dates
- 35 3. Meeting shall be scheduled with a minimum of two weeks' notice.
- 36 a. Contractor shall publish a meeting agenda for the meeting and distribute the meeting
37 agenda and configuration and programming guide to all invited attendees a minimum of one
38 week prior to the meeting.
- 39 4. Contractor shall take detailed notes during the meeting and publish meeting minutes within one
40 week after the meeting. Minutes shall be distributed to attendees, the Architect, and the Engineer.

- 1 2. Data collection points shall:
- 2 a. Include all potential donor antenna locations
- 3 1) Every effort shall be made to be accurate in locating potential donor antenna
- 4 locations and elevations on site during survey, to ensure survey measurements are
- 5 conducted within 10 feet of the actual locations, including elevation.
- 6 b. Be sufficient in quantity and location to provide accurate and sufficiently granular data
- 7 throughout the coverage areas identified on the plans
- 8 c. Be sufficient in quantity and location to properly verify the Contractor's design.
- 9 3. Survey measurements shall include, but not be limited to:
- 10 a. Baseline RF noise at and adjacent to supported frequencies
- 11 b. Signal strength of each supported PSN's macro signals, at all supported frequencies
- 12 c. Continuous wave (CW) testing to validate propagation modeling
- 13 4. Contractor shall update their design as required by the updated survey data.

- 14 3.5
- 15 A. Contractor is solely responsible for the design of the ERRCS.
- 16 B. Contractor shall design the ERRCS in accordance with the manufacturer's instructions and
- 17 recommendations, industry standard best practices, and requirements of all supported PSNs. Where
- 18 discrepancies arise, the more stringent requirement will govern.
- 19 C. Contractor shall design the ERRCS to provide the performance specified herein throughout the coverage
- 20 areas identified on the plans and to meet the approval of all supported PSNs.
- 21 D. Refer to Architectural plans for building occupant information.

22 3.5 WORK SEQUENCE

- 23 A. Refer to Section 270000 for additional information and requirements.

24 3.6 BUILDING ACCESS

- 25 A. Refer to Section 270000 for additional information and requirements.

26 3.7 DAMAGE

- 27 A. Refer to Section 270000 for additional information and requirements.

28 3.8 DEMOLITION

- 29 A. Refer to Section 270000 for additional information and requirements.

30 3.9 DELIVERY, STORAGE, AND HANDLING

- 31 A. Refer to Section 270000 for additional information and requirements.

32 3.10 CLEANING AND REPAIR OF EXISTING MATERIALS

- 33 A. Refer to Section 270000 for additional information and requirements.

34 3.11 CONTINUITY OF EXISTING SERVICES

- 35 A. Refer to Section 270000 for additional information and requirements.

36 3.12 LOCATIONS OF WORK

- 37 A. Refer to Section 270000 for additional information and requirements.

38 3.13 EQUIPMENT ACCESS

- 39 A. Refer to Section 270000 for additional information and requirements.

40 3.14 EQUIPMENT SUPPORTS

- 41 A. Refer to Section 270000 for additional information and requirements.

42 B. Donor Antenna Mounts

- 43 1. Donor antenna assemblies including, but not limited to, antenna(s), antenna cable, antenna
- 44 mount/mast, and all associated accessories and hardware shall be designed and installed to
- 45 withstand sustained winds of ≥ 100 miles per hour from any direction with all devices, equipment,
- 46 and material installed and with up to 1 inch of radial ice accumulated.

- 1 C. Scheduling
2 1. Testing shall be scheduled a minimum of two weeks prior to the scheduled date of final completion.
3 a. Contractor shall coordinate with each WSP and with PSEs to arrange for them to observe
4 system testing.
- 5 D. Data collection points
6 1. Data collection points shall include:
7 a. (30) locations minimum on each level, equally dispersed.
8 2. Be sufficient in quantity and location to properly verify that the system's performance meets the
9 specified requirements and the requirements of each PSE and referenced codes.
10 a. At a minimum, each floor shall be divided in to twenty equal areas and data shall be
11 collected at or as near as is practical to the center of each area.
- 12 E. Survey measurements shall include, but not be limited to:
13 1. Baseline RF noise at and adjacent to supported frequencies
14 2. Signal strength of each supported PSN's macro signals, at all supported frequencies
15 3. Continuous wave (CW) testing
16 4. Signal strength of each supported PSN's system coverage signals, at all supported frequencies
- 17 F. At no additional cost to the Owner, Contractor shall adjust, modify, and/or add to system as necessary to
18 achieve required performance.
- 19 3.22 START-UP
20 A. Refer to Section 270000 for additional information and requirements.
- 21 3.23 ATTIC STOCK
22 A. Refer to Section 270000 for additional information and requirements.
23 B. Contractor shall provide the following spare devices and equipment as Owner's attic stock:
24 1. Coverage Antennas: Three (3) of each type provided
25 2. Surge Suppressors: 100% of the quantity installed of each type provided.
26 3. Fuses: 20% of each type provided as part of system devices and equipment, minimum ten (10) of
27 each type provided.
- 28 3.24 DOCUMENTATION
29 A. Refer to Section 270000 for additional information and requirements.
- 30 3.25 CLEANING
31 A. Refer to Section 270000 for additional information and requirements.
- 32 3.26 TRAINING
33 A. Refer to Section 270000 for additional information and requirements.
34 B. Contractor shall provide to Owner's designated representative(s) a minimum of one (1) 4-hour on-site
35 training session related to work under this section within thirty (30) days of substantial completion.

36 END OF SECTION
37



Department of Public Works

Engineering Division

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Kathleen M. Cryan

Mapping Section Manager

Eric T. Pederson, P.S.

Financial Manager

Steven B. Danner-Rivers

August 2, 2017

NOTICE OF ADDENDUM ADDENDUM NO. 3

CONTRACT NO. 7952 JUDGE DOYLE GARAGE

Revise and amend the contract document(s) for the above project as stated in this addendum, otherwise, the original document shall remain in effect.

Please acknowledge this addendum on page E1 of the contract documents and/or in Section E: Bidder's Acknowledgement on Bid Express.

Electronic version of these documents can be found on the Bid Express web site at:

<http://www.bidexpress.com>

If you are unable to download plan revisions associated with the addendum, please contact the Engineering office at 608-266-4751 receive the material by another route.

Sincerely,

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

Cc: Gregory T. Fries, P.E.

Delete Alternate A-1. Refer to attached section.

Section 07 13 26 - Blindside Self-Adhering Sheet Waterproofing Option C – Horizontal and Vertical
Section revised to add language to clarify materials required to meet the intent of the specification. The Vapor Retarder must be a waterproofing membrane must be continuous under all footings, sump pits, elevator pits, etc. and it must be fully integrated with the vertical blindside waterproofing. Further, the section was revised to add language to include a hot-applied horizontal waterproofing membrane on top of structural slabs and/or over occupied space. Refer to attached section.

Section 07 13 52 - Modified Bituminous Sheet Waterproofing (Blindside Waterproofing) Option S – Horizontal and Vertical

Section revised to add language to clarify materials required to meet the intent of the specification. The Vapor Retarder must be a waterproofing membrane must be continuous under all footings, sump pits, elevator pits, etc. and it must be fully integrated with the vertical blindside waterproofing. Refer to attached section.

Section 07 18 16 - Vehicular Traffic Coatings:

Delete this section.

Section 11 31 00 – Appliances:

Delete this section.

DRAWING ITEMS

Drawing A-100.1:

Traffic coating note deleted.

Drawing A-100.5:

Low point of floor drain was changed to 887'-0". Elevation of vestibule slab was changed to 888'-6". Slab elevation and floor drain low point between Col. 5&6 and Col. C&D.5 were revised. New low point for drainage is at 891'-6". Slab elevations are 892'-0".

Drawing A-101.0:

Entry ramp slab elevations revised. Provide spray cellulose insulation at slab below Bicycle Center. Traffic coating note deleted.

Drawing A-102.0:

Provide spray cellulose insulation at slab below Bicycle Center.

Drawing A-211.0:

K3, H3, K6, and H6 – Stair sections revised per slab elevation changes on Sheet A-100.5.

Drawing A-310.0:

Ramp slope revised per elevation changes on Sheet A-100.5.

Drawing A-311.0:

Updated.

Drawing A-312.0:

Dimension updated.

Drawing A-402.0:

Elevation tag added and dimension updated

Drawing A-411.0:

Garage entry updated to show "Dynamic Message" signage indicated in Parking Signage Schedule.

Drawing A-414.0:

Garage entry updated to show "Dynamic Message" signage indicated in Parking Signage

S-001.0
S-100.1
S-100.3
S-100.5
S-101.0
S-103.0
S-120.5
S-204.0
S-306.0

ATTACHED SPECIFICATIONS:

None.

PARKING CONTROL

SPECIFICATION ITEMS

None

DRAWING ITEMS

Drawing PA-100.5:

On Plan Level UO from grid points C-2.1 to E-2.1 added note to read "PAINT BOTTOM 18" OF OVERHEAD SLAB/WALL WITH ALTERNATING YELLOW/BLACK STRIPES 6" WIDE ON 45 DEGREE ANGLE. ADD NOTE ABOVE STRIPING (7'-0" HEADROOM) WITH 6" HIGH LETTERS AT 3 LOCATIONS".

Drawing PA-601.0:

On the Sign Schedule changed the Sign Type for the following signs:

1. S1 to I.
2. S3 to I.
3. S3A to I.
4. S12 to I.
5. S24 to DM. Drawing PA-601.0:

On the Sign Schedule deleted the remark "ILLUMINATED" for Sign S26. It is a dynamic messaging sign. On the Sign Types Legend changed Mark V to read type - "VEHICULAR (RETRO REFLECTIVE TEXT ONLY)."

ATTACHED DRAWINGS (FULL SIZE):

PA - 100.5
PA - 601.0

ATTACHED SPECIFICATIONS:

None.

MECHANICAL

SPECIFICATION ITEMS

None.

DRAWING ITEMS

Q155: I was hoping to clarify the switchboard breakers on this project. Page 5 - section 2.7 lists Breaker types. 2.7.B for some reason notes "enclosed Insulated case breakers", then, 2.7.B.1 notes that the Main is insulated case, and all feeders 600A and greater are insulated case. Is this the intent that all breakers 600A and above need to be insulated case? Typically we see the main breaker as insulated case and the branch breakers as standard molded case.

A155: Switchboard feeder breakers are not required to be insulated case type. Specification section 262413 has been updated in addendum 3.

Q156: Specification section 11 31 00 - Appliances is included in the specifications. Reviewing this specification there are no products specified to be provided and there is no reference to appliances on the plan sheets for what we are to provide. Please clarify if there is something that we are to provide per the appliance specification or strike it if it doesn't apply to the project.

A156: Appliance specification deleted. Appliances provided by Owner

Q157: In addendum #1 the answer to question #9 states that all type 1 and type 3 walls are to receive a concrete curb typical. In addendum #2 sheet A-500.0 note on detail 1 it states that curbs are to be provided at garage vestibules. Please confirm that all non garage vestibule masonry walls are to be placed directly on the concrete deck and no curb provided per addendum #2.

A157: Confirmed

Q158: In addendum #2 the architectural drawings remove temporary roofs and concrete slabs. The structural drawings added these temporary slabs in on sheet S-103.0. Please confirm that these temporary slabs are not to be included in the contract.

A158: Confirmed

Q159: Addendum #2 sheet A501.0 eliminates the traffic coatings from the project and adds in sealed concrete on all the slabs, sheet A100.1 calls out traffic coating, A101.0 calls out traffic coating thru out as an alternate 1 add. Addendum #2 completely strikes the traffic coating specification and the alternate specification 012300 calls to provide the traffic coating in the base bid and the alternate is to deduct the traffic coating from the project. Please clarify what is to be provided in the base bid, and alternate and re include the traffic coating specification as required for the base bid/alternate. Additionally please update bid express to reflect the added alternate for the elimination of the traffic coating if we are to provide it.

A159: Traffic coatings have been removed from the project. Add alternate for traffic coatings has been removed from the bid.

Q160: Neither addendum #1 or addendum #2 addressed turning in the SBE at a later time than the bid. This was mentioned that it might get changed at the pre-bid walk thru. Please clarify if contractors will be able to turn the SBE good faith documentation at a later time than the bid and if so will we be allowed to email it.

A160: There has been no change to the time that the SBE package must be turned in. The SBE package is due at the same time as the lump sum bid.

Q161: Contract drawings of the fuel system and any application schedule. This is needed to see how the system is setup and what items and accessories are needed for a complete operating system. The specification provided appears to be very generic and not specific to the project. Day Tank Capacity Pumps: How many, required flow rate and discharge pressure available voltage.

SECTION 00 00 05
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LOTHAN VAN HOOK DESTEFANO AND ARCHITECTS LLC
2 AUGUST 2017

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- 10 DIVISION 12 - FINISHINGS
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- 19

LOTHAN VAN HOOK DESTEFANO AND ARCHITECTS LLC
2 AUGUST 2017

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- 49 32 9113 Soil Preparation
- 50 32 9300 Plants
- 51 DIVISION 33 - UTILITIES
- 52 Not Used
- 53 END OF DOCUMENT

SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
- 1.2 SUMMARY
- 1.3 DEFINITIONS
- 1.4 PROCEDURES

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

- 3.1 SCHEDULE OF ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other work of the Contract.
- C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. S-1: CONCRETE ADMIXTURES.
 - 1. Base Bid: Provide concrete mix designs and admixtures per drawing schedule.
 - 2. Alternate: Provide crystalline admixture in the scheduled concrete mix design for the structural decks.
- ~~B. Alternate No. A-1: VEHICULAR TRAFFIC COATINGS.
 - 1. Base Bid: Provide vehicular traffic coatings as indicated on Drawings A-100.2, A-100.3, A-100.4, A-100.5, A-101.0, and A-203.0 and as specified in Section 07-18-16 "Vehicular Traffic Coatings".
 - 2. Alternate: Delete vehicle traffic coatings scope of Work as indicated on Drawings A-100.2, A-100.3, A-100.4, A-100.5, A-101.0, and A-203.0 and as specified in Section 07-18-16 "Vehicular Traffic Coatings".~~

SECTION 07 13 26

BLINDSIDE SELF-ADHERING SHEET WATERPROOFING OPTION C - HORIZONTAL AND VERTICAL

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
- 1.2 DESCRIPTION
- 1.3 REFERENCE STANDARDS
- 1.4 QUALITY ASSURANCE
- 1.5 SUBMITTALS
- 1.6 WARRANTY
- 1.7 JOB CONDITIONS
- 1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

PART 2 - PRODUCTS

- 2.1 GENERAL
- 2.2 MEMBRANE
- 2.3 VAPOR RETARDER
- 2.4 HOT-APPLIED LIQUID MEMBRANE
- 2.5 MIRAPLY-H RELATED ACCESSORY PRODUCTS
- 2.6 MIRAPLY-V RELATED ACCESSORY PRODUCTS
- 2.7 CARLISLE BLINDSIDE PHYSICAL PROPERTIES MIRAPLY-H
- 2.8 CARLISLE BLINDSIDE PHYSICAL PROPERTIES MIRAPLY-V

PART 3 - EXECUTION

- 3.1 GENERAL
- 3.2 SUBSTRATE REQUIREMENTS
- 3.3 INSTALLATION: HORIZONTAL
- 3.4 INSTALLATION: VERTICAL
- 3.5 INSTALLATION: HOT-APPLIED LIQUID MEMBRANE

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 DESCRIPTION

- A. Carlisle Coatings and Waterproofing Blindside Waterproofing System utilizes the MiraPLY-H Waterproofing System fully adhered to poured concrete. The dual membrane is comprised of TPO and Butyl Alloy adhesive with a total thickness of 70 mils.
- B. Carlisle Coatings and Waterproofing Blindside Waterproofing System utilizes the MiraPLY-V Waterproofing System fully adhered to poured concrete. The dual membrane is comprised of TPO and Butyl Alloy adhesive with a total thickness of 47 mils.

1.3 REFERENCE STANDARDS

- A. ASTM D 412 Standard Test Methods for Rubber Properties in Tension
- B. ASTM D 570 Standard Test Methods for Water Absorption of Plastics
- C. ASTM D 624 Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
- D. ASTM D 882 Standard Test Method for Tensile Properties of Thin Plastic Sheeting
- E. ASTM D 903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
- F. ASTM D 1876 Standard Test Method for Peel Release of Adhesives (T-Peel)
- G. ASTM D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
- H. ASTM D 3767 Standard Practice for Rubber - Measurements of Dimensions
- I. ASTM D 5385 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
- J. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials
- K. ASTM E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

ISSUED FOR ADDENDUM #3

JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE

CONTRACT # 7952 MUNIS # 11471

071326 - 1

BLINDSIDE SELF-ADHERING SHEET
WATERPROOFING

- 1 B. Maintain work area in a neat and orderly condition, removing empty containers, rags, and rubbish
2 daily from the site.
- 3 1.8 **PRODUCT DELIVERY, STORAGE AND HANDLING**
- 4 A. Deliver materials to project site in original, factory-sealed, unopened containers bearing
5 manufacturer's name and label intact and legible with the following information:
- 6 1. Name of material
- 7 2. Manufacturer's stock number and date of manufacture
- 8 3. Material safety data sheet.
- 9 B. Store membrane and accessory products in a protected area out of direct sunlight and between
10 40°F and 100°F. Protect from rain, physical damage and construction traffic.
- 11

12 **PART 2 - PRODUCTS**

13 **2.1 GENERAL**

- 14 A. Provide products manufactured and supplied by Carlisle Coatings & Waterproofing Inc, 900 Hensley
15 Lane, Wylie Texas 75098, phone (800) 527-7098, fax (972) 442-0076.
- 16 B. The components of this Blindside System are to be products of Carlisle Coatings & Waterproofing Inc. The
17 installation, performance or integrity of products by others is not the responsibility of Carlisle Coatings &
18 Waterproofing Inc and is expressly disclaimed by the warranty.

19 **2.2 MEMBRANE**

- 20 A. MiraPLY-H Sheet Membrane: Shall be CCW-MiraPLY-H self-adhering adhesive coated membrane,
21 and shall meet or exceed the requirements listed in charts found on Technical Data Sheet.
- 22 B. MiraPLY-V Sheet Membrane: Shall be CCW-MiraPLY-V self-adhering adhesive coated membrane,
23 and shall meet or exceed the requirements listed in charts found in section 2.

24 **2.3 VAPOR RETARDER**

- 25 A. MiraPLY-H Sheet Membrane: Shall be CCW-MiraPLY-H self-adhering adhesive coated
26 membrane, and shall meet or exceed the requirements listed in charts found on Technical
27 Data Sheet.

28 **2.4 HOT-APPLIED LIQUID MEMBRANE**

- 29 A. Shall be CCW-500R, supplied by Carlisle Coatings & Waterproofing, Inc.
- 30 1. Hot-applied liquid membrane: Shall be CCW-500 Hot-Applied Membrane, rubberized asphalt
31 compound, and shall meet or exceed the requirements of CGSB-37.50-M89.
- 32 2. Reinforcing fabric: Shall be CCW-500 Reinforcing Fabric which is a 1.18 oz/square yard
33 spunbond polyester fabric.
- 34 3. Flashings: Shall be CCW-711-90 90-Mil Sheet Membrane and Flashing or CCW 60-mil uncured
35 neoprene for non-exposed areas and Sure-Seal® EPDM, Sure Weld 120-mil AFX TPO or Sure
36 Seal Fleeceback 115-mil EPDM for exposed areas.
- 37 4. Surface Primer: Shall be CCW-550 Primer.
- 38 5. Mastic: Shall be CCW-550, CCW-702, CCW-702LV or CCW-AWP.
- 39 6. Sealants: Shall be CCW-703 Vertical Grade LIQUISEAL™ Membrane or CCW-201 two-
40 component Polyurethane Sealant.
- 41 7. Backer Rod: Shall be closed-cell polyethylene foam rod.
- 42 8. Expansion Joints: Shall be the EJ-500
- 43 9. Protection Course: Shall be CCW Protection Board-HS or H.
- 44 10. Root Barrier: Shall be the CCW Root Barrier
- 45 11. Drainage Composite: Shall be CCW MiraDRAIN as recommended by the manufacturer for
46 each condition.
- 47 12. Insulation: Shall be extruded or expanded polystyrene insulation with a minimum 40 psi (or
48 as specified by architect) compressive strength as manufactured by Insulfoam, Foamular or
49 Dow.
- 50 13. CCW 200V, CCW 300 HV or H.P Protective Mat shall be applied over insulation prior to
51 overburden placement.

TPO	—	mils (mm)	22 (.56)
Butyl Alloy	—	mils (mm)	25 (.64)
Thickness per ASTM D 5147 across sheet	ASTM D1970	mils (mm)	47 (1.19)
Water Vapor Transmission	ASTM E96 (Water Method)	perms	0.100
Tensile Strength ¹	ASTM D882	psi	1,360
300% Modulus ¹	ASTM D412	psi	1,390
90° T-Peel	ASTM D1876	lb.	>5.0
Elongation @ Break @ 23°C (Die C) ¹	ASTM D412	%	335
Flexibility Temperature @ -29°C (-20°F) ¹	ASTM D1970	pass/fail	No Cracking @-29°C (-20°F)
Hydrostatic Pressure Resistance	ASTM D5385	ft.	>231 ft. (100 psi)
Peel Strength Over Poured Concrete (tested w/2" strips)	ASTM D903	lb.	5.6
Puncture Resistance Elongation	ASTM E154	in.	4.9
Puncture Resistance Load at Puncture	ASTM E154	lb.	106.4
Tear Strength of Vulcanized Rubber and Thermoplastics Die C ¹	ASTM D624	psi	685
Soil Decay Testing- E 96 Permeance	ASTM E154		Pass
Soil Decay Testing- Weight Loss	ASTM E154		Pass
Lateral Water Migration Resistance ²	ASTM D5385 modified		Pass at 100 psi (231 ft) of hydrostatic pressure

- 1 to the corner with no seams in the corner. Install an adequate number of fasteners across the top of
- 2 the MiraPLY-V to support and keep the membrane tight against the substrate without wrinkles and
- 3 blousing until concrete is poured. Walls higher than 8'-0" require fasteners in the field of the MiraPLY-
- 4 V membrane with approximately 1 fastener per 2 ft² (not including fasteners at the perimeter). Fasten
- 5 perimeter edges of MiraPLY approximately 12" on center and a minimum of 6" from the edge.
- 6 Caution – over driven fasteners can cause stress in the membrane and seams.
- 7 2. Unroll the the next sheet of MiraPLY-V and align parallel to and overlap the preceding roll of
- 8 MiraPLY-V 3" and a minimum 3" end overlap. Stagger end laps. Ensure that the membrane
- 9 lays flat and no openings are visible. Make sure that the TPO side of the lap is clean, dry and
- 10 free of contaminants and prime TPO with HP-250 Primer or Low VOC Primer.
- 11 3. Remove the release liner on the lap (edge of the sheet) and mate the two sheets together. Lap area
- 12 shall be rolled with a hard rubber roller using firm hand pressure.
- 13 4. Leave the plastic liner on MiraPLY-V until ready for concrete pour or placement of rebar. Cover
- 14 fasteners with a 3" x 3" piece of SecurTAPE, P/S Elastofom Flashing or CCW Detail Tape.
- 15

16 3.5 INSTALLATION: HOT-APPLIED LIQUID MEMBRANE

17 A. Inspection

- 18 1. Before any waterproofing work is started the waterproofing applicator shall thoroughly
- 19 examine all surfaces for any deficiencies. Should any deficiencies exist, the architect, owner,
- 20 or general contractor shall be notified in writing and corrections made.
- 21 2. Condition of Concrete Surfaces:
- 22 a. The concrete surfaces shall be of sound structural grade, 3500 psi minimum, and shall
- 23 have a wood float or fine broom finish, free of fins, ridges, voids or entrained air holes.
- 24 b. Concrete shall be cured by water curing method. Curing compounds must be of the
- 25 pure sodium silicate type and be approved by the Carlisle representative.
- 26 c. Concrete shall be cured at least 14 days and shall be sloped for proper drainage.
- 27 d. Voids, rock pockets and excessively rough surfaces shall be repaired with approved
- 28 non-shrink grout or ground to match the un-repaired areas.
- 29 e. Two-stage drains shall have a minimum three inch flange and be installed with the
- 30 flange flush and level with the concrete surface.
- 31 f. Surfaces at cold joints shall be on the same plane.

32 B. Surface Preparation

- 33 1. The concrete surface must be thoroughly clean, dry and free from any surface contaminates
- 34 or cleaning residue that may harmfully affect the adhesion of the membrane.
- 35 2. Detail expansion joints per manufacturer's recommendation using the EJ-500.
- 36 3. Apply a thin film of CCW-550, CCW-702, CCW-702LV or CCW-AWP primer 16" wide, centered
- 37 over sealed cracks and joints. Apply 60-90 mils of CCW-550, CCW-702, CCW-702LV or CCW-
- 38 AWP membrane to cover primed areas. Install a 12" wide strip of CCW-711-90 centered over
- 39 joints and cracks greater than 1/16" in width.
- 40 4. Preferred Flashing Method (500-4B): Apply CCW-550, CCW-702, CCW-702LV or CCW-AWP
- 41 Primer at the juncture of all horizontal surfaces and vertical surfaces to the height indicated
- 42 on the drawings (eight inches min. recommended), such as parapet walls, curbs, columns
- 43 and all penetrations through the deck at at the published sq. ft. per gallon rate recommended.
- 44 Avoid puddles. Allow primer to dry for 1 hour minimum, 8 hours maximum. Membrane will not
- 45 properly adhere to wet primer. Apply 60-90 mils of CCW-500 membrane to cover primed areas.
- 46 Install CCW-711-90 mil sheet membrane or uncured neoprene flashing into this first course
- 47 of CCW-500 to cover the vertical section and extend six inches onto deck surface. Flashing
- 48 installation may be done during crack and joint treatment or during installation of the first
- 49 layer of CCW-500 membrane. Completely cover all flashing material during installation of the
- 50 subsequent layers of CCW-500 membrane.
- 51 5. Install Sure-Seal EPDM, Sure Weld 120-mil AFX TPO or Sure Seal Fleeceback 115-mil EPDM
- 52 flashings in exposed areas per Carlisle recommendations (500-4A). Always clean and prime
- 53 per Carlisle splice procedure prior to application of CCW-500 membrane.
- 54 6. Apply a thin film of CCW-550, CCW-702, CCW-702LV or CCW-AWP Primer in a four foot square
- 55 area around drains. Allow primer to dry, one hour minimum, eight hours maximum. Apply 60-
- 56 90 mils of CCW-500 membrane to cover primed areas. Install a three foot square section of
- 57 CCW-711-90 or uncured neoprene flashing over the drain and onto the deck. No splices or
- 58 seams are allowed within three inches of the drain flange. Terminate the flashing under the
- 59 clamping ring of the drain and cut away the inner portion of the flashing. Use firm pressure

SECTION 07 13 52

MODIFIED BITUMINOUS SHEET WATERPROOFING (BLINDSIDE WATERPROOFING) OPTION S -
HORIZONTAL AND VERTICAL

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
- 1.2 SUMMARY
- 1.3 DEFINITIONS
- 1.4 REFERENCES
- 1.5 ACTION SUBMITTALS
- 1.6 INFORMATIONAL SUBMITTALS
- 1.7 CLOSEOUT SUBMITTALS
- 1.8 QUALITY ASSURANCE
- 1.9 DELIVERY, STORAGE AND HANDLING
- 1.10 WARRANTY

PART 2 - PRODUCTS

- 2.1 MANUFACTURER
- 2.2 WATERPROOFING SYSTEM
- 2.3 BLINDSIDE WATERPROOFING
- 2.4 ACCESSORIES

PART 3 - EXECUTION

- 3.1 EXAMINATION
- 3.2 PREPARATION
- 3.3 DRAINAGE MAT APPLICATION
- 3.4 PRE-APPLIED PROTECTION BOARD APPLICATION
- 3.5 POST APPLIED PROTECTION SHEET APPLICATION
- 3.6 PRIMER APPLICATION
- 3.7 VERTICAL FIELD MEMBRANE APPLICATION (COLPHENE BSW V)
- 3.8 VERTICAL FIELD MEMBRANE APPLICATION (COLPHENE BSW H)
- 3.9 HORIZONTAL FIELD MEMBRANE APPLICATION (COLPHENE BSW H)
- 3.10 LIQUID-APPLIED FLASHING, (PMA MEMBRANE APPLICATION) (ALSAN RS 260 LO FLASH)
- 3.11 LIQUID-APPLIED FLASHING, (PMMA MEMBRANE APPLICATION) (ALSAN 230 FLASH)
- 3.12 LIQUID-APPLIED FLASHING (ELASTOMERIC LIQUID MEMBRANE APPLICATION) (COLPHENE LIQUID MEMBRANE)
- 3.13 LIQUID-APPLIED FLASHING (BITUMEN-URETHANE MEMBRANE APPLICATION) (ALSAN FLASHING)
- 3.14 CLEAN-UP

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. Work shall include, but is not limited to, the following:
 - 1. Preparation of all field and flashing substrates.
 - 2. Drainage mat, mechanically fastened.
 - 3. Protection board, mechanically fastened.
 - 4. SBS-modified bitumen vertical field membrane.
 - 5. SBS-modified bitumen horizontal field membrane.
 - 6. Protection sheet, self-adhered.
 - 7. Liquid-applied, reinforced flashings.
 - 8. All related materials and labor required to complete specified waterproofing necessary to receive specified manufacturer's warranty.

1.3 DEFINITIONS

- A. ASTM D 1079 - Definitions of Term Relating to Roofing and Waterproofing.
- B. The National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual, Fifth Edition Glossary.

ISSUED FOR ADDENDUM #3

JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE

CONTRACT # 7952 MUNIS # 11471

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MODIFIED BITUMINOUS
SHEET WATERPROOFING

- 1 C. Protect and store materials in a dry, well-vented, and weatherproof location. Only materials to be used the
2 same day shall be removed from this location. During cold weather, store materials in a heated location,
3 removed only as needed for immediate use.
- 4 D. When materials are to be stored outdoors, store away from standing water, stacked on raised pallets or
5 dunnage, at least 4 in or more above ground level. Carefully cover storage with "breathable" tarpaulins to
6 protect materials from precipitation and to prevent exposure to condensation.
- 7 E. Carefully store waterproofing membrane materials delivered in rolls on-end with selvage edges up. Store
8 and protect roll storage to prevent damage.
- 9 F. Properly dispose of all product wrappers, pallets, cardboard tubes, scrap, waste, and debris. All damaged
10 materials shall be removed from job site and replaced with new, suitable materials.

11 **1.10 SITE CONDITIONS**

12 **A. Safety:**

- 13 1. The contractor shall be responsible for complying with all project-related safety and environmental
14 requirements.
- 15 2. Heat-welding shall include heating the specified membrane ply using propane roof torches or electric
16 hot-air welding equipment. The contractor shall determine when and where conditions are
17 appropriate to utilize heat-welding equipment. When conditions are determined by the contractor to
18 be unsafe to proceed, equivalent SBS-modified bitumen materials and methods shall be utilized to
19 accommodate requirements and conditions.
- 20 3. Refer to NRCA CERTA recommendations, local codes and building owner's requirements for hot
21 work operations.
- 22 4. The contractor shall review project conditions and determine when and where conditions are
23 appropriate to utilize the specified liquid-applied, or semi-solid waterproofing materials. When
24 conditions are determined by the contractor to be unsafe or undesirable to proceed, measures shall
25 be taken to prevent or eliminate the unsafe or undesirable exposures and conditions, or equivalent
26 approved materials and methods shall be utilized to accommodate requirements and conditions.
- 27 5. The contractor shall refer to product Safety Data Sheets (SDS) for health, safety, and environment
28 related hazards, and take all necessary measures and precautions to comply with exposure
29 requirements.

30 **B. Environmental Conditions:**

- 31 1. Monitor substrate temperature and material temperature, as well as all environmental conditions such
32 as ambient temperature, moisture, sun, cloud cover, wind, humidity, and shade. Ensure conditions
33 are satisfactory to begin work and ensure conditions remain satisfactory during the installation of
34 specified materials. Materials and methods shall be adjusted as necessary to accommodate varying
35 project conditions. Materials shall not be installed when conditions are unacceptable to achieve the
36 specified results.
- 37 2. Precipitation and dew point: Monitor weather to ensure the project environment is dry before, and
38 will remain dry, during the application of waterproofing materials. Ensure all waterproofing materials
39 and substrates remain above the dew point temperature as required to prevent condensation and
40 maintain dry conditions.
- 41 3. Self-adhered membrane application: During cold weather, store the specified self-adhered
42 membrane and primer materials in heated storage areas to ensure materials remain no less than
43 70°F (21°C) during application. Ensure conditions allow primer to remain tacky, but not wet so that
44 primer will transfer to finger when touched. Self-adhered primer should not fully dry and lose tack
45 before applying the self-adhered membrane. Ensure conditions remain satisfactory to achieve
46 membrane adhesion as specified.
- 47 4. Heat-Welding Application: Take all necessary precautions and measures to monitor conditions to
48 ensure all environmental conditions are safe to proceed with the use of torches and hot-air welding
49 equipment. Combustibles, flammable liquids and solvent vapors that represent a hazard shall be
50 eliminated and primers shall be fully dry before proceeding with heat-welding operations. Refer to
51 NRCA CERTA recommendations.

52 **1.11 WARRANTY**

- 53 **A. Manufacturer's Warranty:** The manufacturer shall provide the owner with the manufacturer's warranty
54 providing labor and materials for a period of 10 years from the date the warranty is issued.
- 55 **B.** The contractor shall guarantee the workmanship and shall provide the owner with the contractor's warranty
56 covering workmanship for a period of 2 years from completion date.

- 1 16) Methane Gas Permeability (ASTM D 1434): $1.6 \cdot 10^{-6} \text{ft}^2/\text{hr}$ at 14.7 psia ($4.12 \cdot 10^{-7}$
2 cm^2/sec at 1 atm)
- 3 17) Coefficient of Friction (ASTM D 1894): sanded side on sanded side, 1.04 static 0.71
4 kinetic
- 5 18) Coefficient of Friction (ASTM D 1894): sanded side on concrete, 0.75 static 0.63
6 kinetic
- 7 B. Horizontal Field Membrane:
- 8 1. SBS-Modified Bitumen:
- 9 a. Soprema Colphene BSW H: SBS-modified bitumen membrane with plastic burn-off film on
10 the bottom surface and a sanded top surface used for horizontal blindside waterproofing
11 applications. Polyester reinforcement.
- 12 1) Thickness: 140 mils (3.5 mm)
- 13 2) Width: 39.4 in (1 m)
- 14 3) Length: 32.8 ft (10 m)
- 15 4) Adhesion of Poured Concrete (ASTM D 903 modified): 19.6 lbf/in (3430 N/m)
- 16 5) Puncture Resistance (ASTM E154): 311 lb (1383N)
- 17 6) Resistance to Hydrostatic Head (ASTM D 5385 modified): >360 ft (110 m)
- 18 7) Resistance to Lateral Migration (ASTM D 5385 modified): >360 ft (110 m)
- 19 8) Tensile Strength, MD/XD (ASTM D 412): 3437/2638 psi (23.7/18.1 MPa)
- 20 9) Ultimate Elongation, MD/XD (ASTM D 412): 67/74 %
- 21 10) Low Temperature Flexibility (ASTM D 1970): Unaffected at -4°F (-20°C)
- 22 11) Tear Resistance (ASTM D 5601): 28.1 lbf (125 N)
- 23 12) Low Temperature Crack Bridging (ASTM C 836 (C1305)): Unaffected at -9°F (-23°C)
- 24 13) Lap Peel Adhesion (ASTM D 1786): 7.7 lbf/in (1360 N/m)
- 25 14) Water Vapor Transmission (ASTM E 96 Procedure B): <0.037 perms (2.1 $\text{ng}/\text{Pa} \cdot \text{s} \cdot \text{m}^2$)
- 26 15) Water Absorption (maximum) (ASTM D 570): 0.5 %
- 27 16) Methane Gas Permeability (ASTM D 1434): $1.6 \cdot 10^{-6} \text{ft}^2/\text{hr}$ at 14.7 psia ($4.12 \cdot 10^{-7}$
28 cm^2/sec at 1 atm)
- 29 17) Coefficient of Friction (ASTM D 1894): sanded side on sanded side, 1.04 static 0.71
30 kinetic
- 31 18) Coefficient of Friction (ASTM D 1894): sanded side on concrete, 0.75 static 0.63
32 kinetic
- 33 C. Vapor Retarder
- 34 1. SBS-Modified Bitumen:
- 35 a. Soprema Colphene Flam 180
- 36 1) Thickness: 140 mils (3.5 mm)
- 37 2) Width: 39.4 in (1 m)
- 38 3) Length: 32.8 ft (10 m)
- 39 4) Adhesion of Poured Concrete (ASTM D 903 modified): 19.6 lbf/in (3430 N/m)
- 40 5) Puncture Resistance (ASTM E154): 311 lb (1383N)
- 41 6) Resistance to Hydrostatic Head (ASTM D 5385 modified): >360 ft (110 m)
- 42 7) Resistance to Lateral Migration (ASTM D 5385 modified): >360 ft (110 m)
- 43 8) Tensile Strength, MD/XD (ASTM D 412): 3437/2638 psi (23.7/18.1 MPa)
- 44 9) Ultimate Elongation, MD/XD (ASTM D 412): 67/74 %
- 45 10) Low Temperature Flexibility (ASTM D 1970): Unaffected at -4°F (-20°C)
- 46 11) Tear Resistance (ASTM D 5601): 28.1 lbf (125 N)
- 47 12) Low Temperature Crack Bridging (ASTM C 836 (C1305)): Unaffected at -9°F (-
48 23°C)
- 49 13) Lap Peel Adhesion (ASTM D 1786): 7.7 lbf/in (1360 N/m)
- 50 14) Water Vapor Transmission (ASTM E 96 Procedure B): <0.037 perms (2.1
51 $\text{ng}/\text{Pa} \cdot \text{s} \cdot \text{m}^2$)
- 52 15) Water Absorption (maximum) (ASTM D 570): 0.5 %
- 53 16) Methane Gas Permeability (ASTM D 1434): $1.6 \cdot 10^{-6} \text{ft}^2/\text{hr}$ at 14.7 psia ($4.12 \cdot 10^{-7}$
54 cm^2/sec at 1 atm)
- 55 17) Coefficient of Friction (ASTM D 1894): sanded side on sanded side, 1.04 static
56 0.71 kinetic
- 57 18) Coefficient of Friction (ASTM D 1894): sanded side on concrete, 0.75 static 0.63
58 kinetic
- 59 D. Flashing Membrane
- 60 1. Polymethacrylate Liquid-applied Flashing (PMA):

1. Soprema Sopradrain 10-G: High density drainage mat with a non-woven, factory laminated geotextile fabric on the top side used to drain vertical and horizontal blindside waterproofing applications.
 - a. Width: 72 in (1.83 m)
 - b. Length: 50 ft (15.25 m)
 - c. Compressive Strength (kPa): 550 (11,000 psf)
 2. Soprema Sopradrain ECO-2: Entangled polypropylene filament drainage mat with a geocomposite fabric on both sides used to drain vertical and horizontal blindside waterproofing applications.
 - a. Width: 39 in (1 m)
 - b. Length: 100 ft (30 m)
 - c. Compressive Strength: 1436 kPa (>30,000 psf)
- F. Pre-applied Protection Board
1. Soprema Sopraboard: Mineral fortified, asphaltic roof substrate board with glass fiber facers. For use as a protection board on vertical and horizontal substrates in blindside waterproofing applications. Asphaltic Protection Board shall be manufactured by the membrane supplier.
 - a. Thickness: 1/4 in
 - b. Dimensions: 4 x 4 ft
- G. Post Applied Protection Sheet
1. Soprema Colphene BSW Protect'n: SBS-modified bitumen, self-adhesive membrane with release film on the bottom surface and a sanded top surface used as a secondary protection on horizontal blindside waterproofing applications. Composite reinforcement.
 - a. Thickness: 80 mils (2.0 mm)
 - b. Width: 39.4 in (1 m)
 - c. Length: 49.2 ft (15 m)

2.4 ACCESSORIES

A. Primers:

1. Soprema Sopraseal Stick: Self-Adhered membrane primer. SBS polymer, resin and, solvent-based primer for the preparation of membrane substrates for self-adhered SBS membrane and self-adhered SBS flashing applications.
2. Soprema Elastocol Stick Zero: Zero VOC, self-adhesive membrane primer. Low VOC solvent-based primer for the preparation of membrane substrates for self-adhered SBS membrane and self-adhered SBS flashing applications.

B. Fasteners and Plates:

1. Soprema #12 DP Fastener and 3 in stress plate: Fastener and plate used to secure drainage mat to wood lagging.
2. Soprema #12 DP Fastener and 2 in stress plate: Fastener and plate used to secure vertical field membrane to wood lagging.

C. Waterstop: Bentonite/butyl-rubber waterstop, RX-101 rectangle, 1" x 3/4", such as by Volclay, www.CETCO.com.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examination includes visual observations, qualitative analysis, and quantitative testing measures as necessary to ensure conditions remain satisfactory throughout the project.
- B. The contractor shall examine all waterproofing substrates.
- C. The applicator shall not begin installation until conditions have been properly examined and determined to be clean, dry and, otherwise satisfactory to receive specified waterproofing materials.
- D. During the application of specified materials, the applicator shall continue to examine all project conditions to ensure conditions remain satisfactory to complete the specified waterproofing system.
- E. No waterproofing membranes will be installed during rain or snowfall. Use of salt or calcium is prohibited to remove ice or snow.
- F. Verify the compatibility of all membrane components with curing compounds, coatings or other materials which are already or will be installed on the surfaces to be treated.

3.2 PREPARATION

- A. Before commencing work each day, the contractor shall prepare all waterproofing substrates to ensure conditions are satisfactory to proceed with the installation of specified waterproofing materials. Preparation of substrates includes, but is not limited to, substrate repairs, securement of substrates, eliminating all incompatible materials; and cleaning.

ISSUED FOR ADDENDUM #3

JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE

CONTRACT # 7952 MUNIS # 11471

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MODIFIED BITUMINOUS
SHEET WATERPROOFING

- 1 E. As the release film is peeled away, use an approved membrane roller to roll-in vertical membrane to firmly
- 2 set the sheet in place. Ensure full contact is made between the ply and the substrate for full adhesion.
- 3 F. Ensure a minimum 4 in side-lap is achieved.
- 4 G. The 4 in duo-selvage side-lap consists of 2 in of self-adhesive on the inside edge of the lap and 2 in of heat
- 5 welded membrane along the outside edge of the side-lap.
- 6 H. Using a roller, seal the self-adhesive portion of the side-lap, and use an approved roofing torch or hot-air
- 7 welder to seal the 2 in heat welded portion of the side lap.
- 8 I. All waterproofing end-laps shall be overlapped 6 in and fully adhered by heat welding.
- 9 J. All end lap joints shall be aligned and overlapped a minimum of 6 in beyond all fastener penetrations and
- 10 holes where fasteners were removed.
- 11 K. Ensure all membrane T-joints are heat welded and fully sealed.
- 12 L. Waterproofing over concrete cold joints shall be reinforced by installing an additional 12 in reinforcing ply of
- 13 membrane over the cold joint, fully heat-welded or self-adhered over primed surface. The waterproofing
- 14 reinforcing ply shall be centered in the angle of the cold joint or over the cold joint.
- 15 M. All waterproofing membrane tie-ins shall be heat-welded to the adjacent ply.
- 16 N. If a negative/back-water lap is created on the positive side of the waterproofing, heat weld or self-adhere a
- 17 reinforcing ply to strip-in the end-lap joint. The reinforcing ply shall extend a minimum of 4 in beyond the
- 18 joint in both directions.
- 19 O. Each day, the contractor shall physically inspect all side and end-laps, and ensure the membrane is fully
- 20 sealed watertight.
- 21 P. Inspect the installation each day to ensure the plies are secure and adhered.
- 22 Q. Repair deficiencies using specified heat-welded or self-adhesive membrane. For self-adhesive repairs,
- 23 prime surfaces using specified self-adhesive primer. Repairs shall extend 6 in beyond the damaged
- 24 membrane.

25 **3.8 VERTICAL FIELD MEMBRANE APPLICATION (COLPHENE BSW H)**

- 26 A. Follow material product data sheets and published general requirements for installation instructions.
- 27 B. Temporarily fasten the top leading edge of the waterproofing ply in place using specified fasteners and
- 28 plates. Upon completion, remove seal and fastener holes using specified heat welded waterproofing
- 29 membrane or specified liquid applied flashing.
- 30 C. Vertical blind side waterproofing membrane shall be applied in lengths not exceeding 16 ft or as necessary
- 31 to accommodate project conditions.
- 32 D. Ensure a minimum 4 in side-lap is achieved.
- 33 E. The 4 in duo-selvage side-lap consists of 2 in of self-adhesive on the inside edge of the lap and 2 in of heat
- 34 welded membrane along the outside edge of the side-lap.
- 35 F. Remove the side-lap release film, and use a roller to seal the self-adhesive portion of the side-lap. Use an
- 36 approved roofing torch or hot-air welder to seal the 2 in heat welded portion of the side lap.
- 37 G. All end lap joints shall be aligned and overlapped a minimum of 6 in beyond all fastener penetrations and
- 38 holes where fasteners were removed.
- 39 H. Waterproofing over concrete cold joints shall be reinforced by installing an additional 12 in reinforcing ply of
- 40 membrane over the cold joint, fully heat-welded or self-adhered over primed surface. The waterproofing
- 41 reinforcing ply shall be centered in the angle of the cold joint or over the cold joint.
- 42 I. All waterproofing membrane tie-ins shall be heat-welded to the adjacent ply.
- 43 J. If a negative/back-water lap is created on the positive side of the waterproofing, heat weld or self-adhere a
- 44 reinforcing ply to strip-in the end-lap joint. The reinforcing ply shall extend a minimum of 4 in beyond the
- 45 joint in both directions.
- 46 K. Each day, the contractor shall physically inspect all side and end-laps, and ensure the membrane is fully
- 47 sealed watertight.
- 48 L. Inspect the installation each day to ensure the plies are secure and adhered.
- 49 M. Repair deficiencies using specified heat-welded or self-adhesive membrane. For self-adhesive repairs,
- 50 prime surfaces using specified self-adhesive primer. Repairs shall extend 6 in beyond the damaged
- 51 membrane.

52 **3.9 HORIZONTAL FIELD MEMBRANE APPLICATION (COLPHENE BSW H)**

- 53 A. Follow material product data sheets and published general requirements for installation instructions.
- 54 B. Unroll horizontal blind side waterproofing membrane loose-laid onto the prepared substrate, or onto
- 55 specified drainage mat/protection board where applicable per design requirements.
- 56 C. The 4 in duo-selvage side-lap consists of 2 in of self-adhesive on the inside edge of the lap and 2 in of heat
- 57 welded membrane along the outside edge of the side-lap.
- 58 D. Remove the side-lap release film, and use a roller to seal the self-adhesive portion of the side-lap. Use an
- 59 approved roofing torch or hot-air welder to seal the 2 in heat welded portion of the side lap.

- 1 1. Pre-cut polyester reinforcing fleece to conform to roof terminations, transitions and penetrations
2 being flashed. Ensure a minimum 2 in overlap of fleece at side and end-laps. Ensure the completed
3 liquid-applied flashing membrane is fully reinforced.
- 4 2. Apply the base coat of liquid resin onto the substrate using a brush or roller, working the material into
5 the surface for complete coverage and full adhesion at 2.0 gallons per square.
- 6 3. Immediately apply the reinforcing fleece into the wet base coat of resin. Using a brush or roller, work
7 the fleece into the wet resin while applying the second coat of liquid resin to completely encapsulate
8 the fleece at 2.0 gallons per square, and extend the liquid resin 1 inch beyond the fleece.
- 9 4. Allow the liquid membrane to sufficiently cure for 24 to 48 hours then apply the finish coat of liquid
10 resin at 2.0 gallons per square.
- 11 E. Pre-cut Colphene BSW V and remove the self-adhesive release film.
- 12 F. Ensure Alsan flashing has cured then wrap the pipe with the Colphene BSW V.
- 13 G. Secure a stainless steel pipe clamp around the Colphene BSW V.

14 3.14 CLEAN-UP

- 15 A. Clean-up and properly dispose of waste and debris resulting from these operations each day as required to
16 prevent damages and disruptions to operations.

17
18 END OF SECTION

SECTION 26 24 13
SWITCHBOARDS

3 PART 1 - GENERAL

- 4 1.1 RELATED WORK
- 5 1.2 DESCRIPTION
- 6 1.3 REFERENCE STANDARDS
- 7 1.4 SUBMITTALS
- 8 1.5 QUALITY ASSURANCE
- 9 1.6 DELIVERY, STORAGE, AND HANDLING
- 10 1.7 WARRANTY

11 PART 2 - PRODUCTS

- 12 2.1 MANUFACTURERS
- 13 2.2 RATINGS
- 14 2.3 CONSTRUCTION
- 15 2.4 SERVICE ENTRANCE
- 16 2.5 SHORT CIRCUIT CURRENT RATING
- 17 2.6 SURGE PROTECTIVE DEVICES (SPD)
- 18 2.7 OVERCURRENT PROTECTIVE DEVICES
- 19 2.8 CONTROL POWER, COMPONENTS IDENTIFICATION, AND CONTROL WIRING
- 20 2.9 ACCESSORY COMPONENTS AND FEATURES

21 PART 3 - EXECUTION

- 22 3.1 COORDINATION
- 23 3.2 EXAMINATION
- 24 3.3 INSTALLATION
- 25 3.4 CONNECTIONS
- 26 3.5 FIELD QUALITY CONTROL
- 27 3.6 REPAINTING
- 28 3.7 ADJUSTING
- 29 3.8 CLEANING
- 30 3.9 DEMONSTRATION

31 PART 1 - GENERAL

32 1.1 RELATED WORK

- 33 A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables
- 34 B. Section 26 0526 - Grounding and Bonding for Electrical Systems
- 35 C. Section 26 0529 - Hangers and Supports for Electrical Systems
- 36 D. Section 26 0548 - Vibration and Seismic Controls for Electrical Systems
- 37 E. Section 26 0553 - Electrical Systems Identification
- 38 F. Section 26 0573 - Power System Studies
- 39 G. Section 26 0812 - Power Distribution Acceptance Tests
- 40 H. Section 26 0813 - Power Distribution Acceptance Test Tables
- 41 I. Section 26 0913 - Electrical Power Monitoring and Control
- 42 J. Section 26 2813 - Fuses
- 43 K. Section 26 4300 - Surge Protective Devices

44 1.2 DESCRIPTION

- 45 A. Section includes free-standing, dead-front type low-voltage distribution switchboards.

46 1.3 REFERENCE STANDARDS

- 47 A. ANSI/IEEE C37.13 - Low-Voltage AC Power Circuit Breakers Used in Enclosures
- 48 B. ANSI/NECA 400 - Recommended Practice for Installing and Maintaining Switchboards
- 49 C. IEEE C62.41.1 Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits
- 50 D. IEEE C62.41.2 Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits
- 51 E. NFPA 70 - National Electrical Code
- 52 F. NEMA AB 1 - Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit Breaker Enclosures
- 53 G. NEMA AB 3 - Molded-Case Circuit Breakers and Their Applications
- 54 H. NEMA FU 1 - Low-Voltage Cartridge Fuses

ISSUED FOR ADDENDUM #3

JUDGE DOYLE SQUARE - BLOCK 88 PARKING GARAGE

CONTRACT # 7952 MUNIS # 11471

26 24 13 - 1

SWITCHBOARDS

- 1 2. Include time-current curves, including selectable ranges for each type of overcurrent
2 protective device.
- 3 1.3 **QUALITY ASSURANCE**
- 4 A. Obtain switchboards from one source and by single manufacturer.
- 5 B. Regulatory Requirements:
- 6 1. Comply with NFPA 70 for components and installation.
- 7 2. Furnish products listed and classified by Underwriters' Laboratories, Inc., as suitable for purpose
8 specified and indicated.
- 9 1.6 **DELIVERY, STORAGE, AND HANDLING**
- 10 A. Store in clean, dry space. Maintain factory wrapping or provide additional canvas or plastic cover to protect
11 units from dirt, fumes, water, corrosive substances, oxidation debris, and traffic. Provide temporary
12 heaters in switchboards as required to prevent condensation.
- 13 B. Deliver switchboards individually wrapped for protection, and mounted on shipping skids. Mark crates,
14 boxes, and cartons clearly to identify equipment. Show crate, box, or carton identification number on
15 shipping invoice.
- 16 C. Handle switchboards in accordance with NEMA PB 2.1 and ANSI/NECA 400. Use factory-installed lifting
17 provisions. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.
- 18 1.7 **WARRANTY**
- 19 A. Refer to Division 01 and Section 26 0000 – General Electrical Requirements for general warranty
20 requirements.
- 21 B. Manufacturer shall provide standard 1 yr warranty against defects in materials and workmanship for products
22 specified in this Section. Warranty period shall begin on date of substantial completion.
- 23 **PART 2 - PRODUCTS**
- 24 2.1 **MANUFACTURERS**
- 25 A. Square D
- 26 2.2 **RATINGS**
- 27 A. Nominal system voltage: As indicated on the drawings or scheduled.
- 28 B. Main bus continuous amp: As indicated on the drawings or scheduled.
- 29 C. Short circuit current rating: as indicated on drawings.
- 30 D. Brace switchboard components to withstand mechanical forces for symmetrical fault current shown.
- 31 2.3 **CONSTRUCTION**
- 32 A. NEMA PB 2, UL 891
- 33 B. Free-standing, dead-front type; vertical sections bolted together; sides and rear covered with removable
34 bolt-on covers; adequate ventilation within enclosure; supporting frame: steel rigidly fastened together, with
35 same outside dimensions as the enclosure.
- 36 C. Adequate strength and rigidity necessary to resist conditions of use to which it may be subjected and to
37 support equipment, devices and appurtenances contained therein.
- 38 D. Incoming lug locations: Top or bottom, as coordinated by electrical contractor.
- 39 E. UL service entrance label.
- 40 F. Environmental Limitations:
- 41 1. Ambient temperatures: Not exceeding 40°C.
- 42 2. Temperature rise: Not to exceed 65°C over a 40°C ambient environment, with no derating required.
- 43 G. Device Mounting and Type:
- 44 1. Front accessible switchboard: Rear aligned for placement against the wall:
- 45 a. Main device: Panel mounted circuit breaker
- 46 b. Feeder devices: Panel mounted circuit breakers
- 47 c. Devices: Front removable; load connections: Front accessible.
- 48 H. Bus:
- 49 1. Material: Copper; copper: 98% conductivity. The bus bars shall have sufficient cross-sectional area
50 to meet UL 891 temperature rise requirements through actual tests. The bus bars shall be standard
51 density rated for 1000 amperes per square inch copper.

- 1 c. Long- and short-time time delay adjustments with I2t response
- 2 d. Ground-fault pickup level, time delay, and I2t response
- 3 3. Current-limiting Circuit Breakers: No fusible element, frame sizes 400 A and smaller; let-through
- 4 ratings less than NEMA FU 1, RK-5.
- 5 4. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with current-limiting fuses; trip
- 6 activation on fuse opening or on opening of fuse compartment door.
- 7 5. Breakers 800A and greater shall be listed for 100% of breaker's continuous ampere rating.
- 8 B. Enclosed, Insulated-Case Circuit Breaker and Accessories: NEMA AB 1, UL 489; fully rated circuit breaker
- 9 with interrupting capacity rating to meet available fault current.
- 10 1. Main breaker shall be insulated-case type circuit breakers. ~~Feeder circuit breakers 600A and above~~
- 11 ~~shall be insulated case type circuit breakers.~~
- 12 2. Two-step, stored-energy closing; manually operated.
- 13 3. A charging handle, closed pushbutton, open pushbutton and Off/On/Charge indicator located on the
- 14 breaker escutcheon and visible with the breaker compartment closed.
- 15 4. Electronic (solid-state microprocessor-based) trip units with interchangeable rating plug, trip
- 16 indicators, field-adjustable settings and the following trip functions:
- 17 a. Instantaneous trip.
- 18 b. Long- and short-time pickup levels.
- 19 c. Long- and short-time time delay adjustments with I2t response.
- 20 d. Ground-fault pickup level, time delay, and I2t response.
- 21 5. Local and remote trip indication and control.
- 22 6. Shunt Trip: 120 V trip coil energized from separate circuit, set to trip at 55% of rated voltage, where
- 23 indicated.
- 24 C. Circuit Breaker Electronic Trip Units general characteristics:
- 25 1. Circuit breakers, with solid-state microprocessor based trip units:
- 26 a. Unit shall consist of current sensors, solid-state trip device, and solid-state adjustable
- 27 time/current curve shaping elements.
- 28 b. Trip units shall be removable to allow for field upgrades.
- 29 c. Trip units shall incorporate "True RMS Sensing."
- 30 2. Solid-state elements shall provide functions as indicated above.
- 31 3. Adjustments shall be made using non-removable, discrete steps.
- 32 4. Sealable transparent cover shall be provided over adjustments.
- 33 5. Adjustable long-time pickup (I_r) and delay shall be available in an adjustable rating plug that is UL
- 34 listed as field-replaceable. Adjustable rating plug shall allow for five minimum long-time pickup
- 35 settings from 0.4 to 1.0 times the sensor plug (I_n). Other adjustable rating plugs shall be available
- 36 for more precise settings to match the application. Long-time delay settings shall be at least three
- 37 bands.
- 38 6. Short-time pickup shall allow for five minimum settings from 1.5 to 10 times I_r . Short-time delay shall
- 39 be at least three bands with I2t ON and OFF.
- 40 7. Instantaneous settings on the trip units shall be available in five minimum bands from 2 to 15 times
- 41 I_n . The instantaneous settings shall also have an OFF setting when short-time pickup is provided.
- 42 8. Trip units shall have the capability to electronically adjust the settings locally and remotely to fine
- 43 increments below the switch settings. Fine increments for pickup adjustments are to be one ampere.
- 44 Fine increments for delay adjustments are to be one second.
- 45 9. Trip unit shall indicate:
- 46 a. Long-time fault
- 47 b. Short-time fault
- 48 c. Instantaneous fault
- 49 d. Ground fault, where provided
- 50 10. Trip unit shall provide local trip indication and capability to indicate local and remote reason for trip,
- 51 i.e., overload, short circuit or ground fault.
- 52 11. Trip unit shall contain means to conduct circuit breaker test, or via separate test kit.
- 53 12. Breaker shall be equipped with externally accessible test points to be used for field testing.
- 54 13. Trip units shall be available to provide real time metering. Metering functions include current, voltage,
- 55 power and frequency.
- 56 14. Trip units shall be provided with the following standard features:
- 57 a. True RMS sensing
- 58 b. LSI
- 59 c. LSIG/Ground-fault trip, where indicated on drawings
- 60 d. Ground Fault Alarm (no trip), with external relay, where required
- 61 e. Adjustable rating plugs
- 62 f. LCD or LED - Long-time pickup

- 1 C. Coordinate with miscellaneous trades for equipment foreign to the electrical installation to be outside of
2 dedicated electrical space.
- 3 D. Coordinate utility company metering equipment requirements.
- 4 E. Verify with manufacturer that "touch-up" paint kit is available for repainting.
- 5 **3.2 EXAMINATION**
- 6 A. Examine areas and surface to receive switchboards for compliance with requirements, installation
7 tolerances, and other conditions affecting performance. Proceed with installation only after unsatisfactory
8 conditions have been completed.
- 9 B. Verify that space indicated for switchboard mounting meets code-required working clearances.
- 10 C. Notify Architect/Engineer of any discrepancies prior to submittal of product data and shop drawings.
- 11 **3.3 INSTALLATION**
- 12 A. Install switchboard in accordance with NEMA PB 2.1 and ANSI/NECA 400.
- 13 B. Switchboard mounting and seismic restraints:
- 14 1. Bolt switchboards to concrete housekeeping pads, using anchor bolts in accordance with Section 26
15 0529 – Hangers and Supports for Electrical Systems. Cast anchor bolt inserts into pads.
- 16 2. Install bushing assemblies for anchor bolts for seismic restraints per requirements in Section 26 0548
17 – Vibration and Seismic Controls for Electrical Systems.
- 18 C. Install engraved plastic nameplates under provisions of Section 26 0553 – Electrical Systems Identification
19 for switchboard, every instrument, overcurrent protective device and disconnect device. Attach nameplate
20 to exterior of switchboard using small corrosion-resistant metal screws and rivets. Do not use contact
21 adhesive. Indicate switchboard manufacturer's name and drawing number, name, amperage, voltage,
22 phase, number of wires, short circuit current rating (amp, RMS symmetrical and MVA 3-phase symmetrical)
23 and momentary and fault-closing ratings (amp, RMS asymmetrical). For each overcurrent protective device
24 and disconnect device, include circuit, load and area served, voltage/phase rating, and fuse size and type,
25 when applicable.
- 26 D. Provide framed, printed operating instructions for switchboards, including control and key interlocking
27 sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear
28 acrylic plastic. Mount on front of switchboards.
- 29 F. Install switchboards in dedicated electrical space per NFPA 70, and as indicated on drawings.
- 30 F. Tighten electrical connectors and terminal according to equipment manufacturer's published torque-
31 tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A-
32 486B.
- 33 G. Install fuses in fusible switch at job site per requirements in Section 26 2813 – Fuses.
- 34 H. Install surge arrestors in cable termination compartments and connect to each phase of circuit, per
35 requirements in Section 26 4300 – Surge Protective Devices.
- 36 I. Connect surge protective devices to switchboard bus per requirements in Section 26 4300 – Surge
37 Protective Devices.
- 38 J. Install utility company metering equipment, devices and wiring in conformance with serving utility
39 requirements.
- 40 K. Tighten electrical connectors and terminals according to equipment manufacturer's published torque-
41 tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A-
42 486B.
- 43 L. Apply temporary heat to maintain temperature according to manufacturer's written instructions.
- 44 **3.4 CONNECTIONS**
- 45 A. Ground switchboards according to Section 26 0526 – Grounding and Bonding for Electrical Systems.
- 46 B. Connect power and control wiring according to Section 26 0519 – Low-Voltage Electrical Power Conductors
47 and Cables.
- 48 **3.5 FIELD QUALITY CONTROL**
- 49 A. Inspect switchboards for physical damage, proper alignment, connections, anchorage, seismic restraints
50 and grounding.
- 51 B. Test continuity of each circuit.
- 52 C. Test switchboards per requirements in Sections 26 0812 – Power Distribution Acceptance Tests and 26
53 0813 – Power Distribution Acceptance Test Tables.
- 54 D. Interpret test results in writing and submit to Engineer.
- 55 E. Test switch operators after energizing.

SECTION 26 32 13
ENGINE GENERATORS

3 PART 1 - GENERAL

- 4 1.1 RELATED WORK
- 5 1.2 DESCRIPTION OF SYSTEM
- 6 1.3 REFERENCE STANDARDS
- 7 1.4 SUBMITTALS
- 8 1.5 DELIVERY, STORAGE, AND HANDLING
- 9 1.6 OPERATION AND MAINTENANCE MANUALS

10 PART 2 - PRODUCTS

- 11 2.1 MATERIALS
- 12 2.2 RATINGS AND PERFORMANCE
- 13 2.3 FABRICATION AND MANUFACTURER
- 14 2.4 INTERFACE WITH BUILDING MANAGEMENT SYSTEM (BMS)

15 PART 3 - EXECUTION

- 16 3.1 INSTALLATION
- 17 3.2 ACCEPTANCE TESTS
- 18 3.3 LOAD TEST

19 PART 1 - GENERAL

20 1.1 RELATED WORK

- 21 A. Section 20 0700 - Mechanical Systems Insulation
- 22 B. Section 23 1214 - Liquid Fuel Systems
- 23 C. Section 23 2118 - Pipe and Pipe Fittings
- 24 D. Section 23 3114 - Ductwork
- 25 E. Section 23 3314 - Ductwork Specialties
- 26 F. Section 26 0000 - General Electrical Requirements
- 27 G. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables
- 28 H. Section 26 0526 - Grounding and Bonding for Electrical Systems
- 29 I. Section 26 0548 - Vibration and Seismic Controls for Electrical Systems
- 30 J. Section 26 0812 - Power Distribution Acceptance Tests
- 31 K. Section 26 0813 - Power Distribution Acceptance Test Tables
- 32 L. Section 26 2313 - Paralleling Low-Voltage Switchgear
- 33 M. Section 26 3623 - Automatic Transfer Switches

34 1.2 DESCRIPTION OF SYSTEM

- 35 A. Section describes complete package generator set, unit-mounted radiator cooling system, microprocessor based control and monitoring panel, battery and charger, Building Management System (BMS) communications module, remote annunciator, ~~drop-over sound attenuated enclosure~~
- 38 B. Package generator set rated for emergency standby duty
- 39 C. Engine fuel system:
 - 40 1. Day Tank provided under specification section 231214 Liquid Fuel Systems

41 1.3 REFERENCE STANDARDS

- 42 A. NEMA MG-1 - Motors and Generators
- 43 B. IEEE446 - Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
- 44 C. NFPA 37 - Standard for Installation and Use of Stationary Combustion Engines and Gas Turbines
- 46 D. NFPA 110 - Standard for Emergency and Standby Power Systems
- 47 E. UL 2200 - Stationary Engine Generator Assemblies
- 48 F. IEC8528 Part 4 - Control Systems for Generator Sets
- 49 G. UL 142 - Steel Aboveground Tanks for Flammable and Combustible Liquids
- 50 H. UL 2085 - Protected Aboveground Tanks for Flammable and Combustible Liquids

- 1 2. Submit, upon completion of installation and testing of engine-generator sets, certified test reports
2 from load tests for each engine-generator.
- 3 1.5 DELIVERY, STORAGE, AND HANDLING
- 4 A. Handle equipment in accordance with manufacturer's written instructions. One copy of instructions is to be
5 included with equipment at time of shipment. Maintain factory bracing, packaging, and wrapping.
- 6 1.6 OPERATION AND MAINTENANCE MANUALS
- 7 A. Refer to Section 01 7700 - Closeout Procedures and herein below.
- 8 B. Submit Operation and Maintenance (O&M) manuals to Engineer for review 60 days prior to acceptance of
9 unit.
- 10 C. Installation, maintenance, and operating instruction manuals shall include, but not limited to, the following:
- 11 1. 100% accurate system "as-installed" drawings, interconnected diagrams, schematic diagrams, wiring
12 diagrams, individual sub-system component manuals, operation procedures, system description with
13 theory of operation, maintenance schedules and procedures, original programmed settings and
14 parameters, and other information necessary for the Owner to maintain, operate, test, and
15 troubleshoot system.
- 16 2. The O&M manual shall contain step-by-step instructions for startup and shutdown. The first page
17 shall contain name, address, and phone number of local representative to be called for service or
18 parts. Follow with complete parts lists by actual ordering catalog numbers. O&M manual also shall
19 contain four copies each of test record forms and service record forms for Owner use. Forms shall
20 show proper interval for testing, servicing, and replacing of components, lubrication, filters,
21 antifreeze, etc., including recommended specifications and fluid levels for lubricants.
- 22 3. Recommended spare parts list (with pricing) for 2 yrs of operation.
- 23 D. O&M manuals shall not solely rely on sub-component manuals. Thorough consolidation of operating and
24 maintenance information shall be available in system overview guide. Include major components of system
25 in overview.
- 26 E. Turn final reviewed manuals over to Owner prior to conducting training of Owner personnel.
- 27 F. Seal single copy of service record forms, recommended operation and service practices for unit in plastic
28 and wall mount in weather-protective enclosure.

29 PART 2 - PRODUCTS

- 30 2.1 MATERIALS
- 31 A. Acceptable Manufacturers:
- 32 1. Engine Generator Set - Caterpillar, Cummins, MTU Onsite Energy
- 33 2. Exhaust Silencer - Maxim, Nelson, or approved equal
- 34 3. Isolation equipment
- 35 4. Battery charger - Sens, La Marche, Charles Industries
- 36 2.2 RATINGS AND PERFORMANCE
- 37 A. Engine Generator Set
- 38 1. Generator kW Output: As shown on drawings
- 39 2. Altitude 500 ft above sea level in ambient temperature of 90°F
- 40 3. Stable frequency regulation
- 41 B. Alternator
- 42 1. As shown on drawings, .8 Power Factor
- 43 2. 480 V, 3 Ph, 60 Hz, 4 Wire Y
- 44 3. Stable voltage regulation 0-full load less than or equal to $\pm .5\%$.
- 45 C. Transient Performance
- 46 1. Engine
- 47 a. Start and load in 10 seconds per NFPA 110
- 48 b. Accept 100% block load per NFPA 110
- 49 2. Frequency regulation $\pm .25\%$ no load to full load. $\pm .25\%$ steady state.
- 50 3. Alternator
- 51 a. 15% Voltage dip
- 52 b. AC waveform output contains <5% total harmonic distortion (THD) at full linear load when
53 measured from line to neutral with <3% in any single harmonic, and no third-order harmonics
54 or their multiples.
- 55 c. Telephone influence factor < 40

- 1 d. Connect to generator distribution system
- 2 e. Core guard
- 3 f. Fan guard
- 4 g. Mounting hardware
- 5 h. Direct adapter flange. Ductwork with flexible connection between radiator and exhaust
6 plenum to be provided by Division 23. Coordinate with Division 23.
- 7 i. Flexible pipe connections at engine and radiator.
- 8 j. Supply power for fans and pumps on remote radiators from a tap at generator output terminals
9 or ahead of first load circuit overcurrent protective device.
- 10 k. Heat exchangers
- 11 4. Block Heater
- 12 a. Water Jacket Heater: Circulating
- 13 b. Maintain engine jacket water to 110°F in ambient temperature of 30°F
- 14 c. Heater to be equipped with thermostatic switch.
- 15 d. Single phase 208V
- 16 e. Provide two heaters, 4500 W each minimum.
- 17 f. Fill engine oil plug ports with solution of 30W40 oil and glycol at initial fill.
- 18 g. Flexible pipe with flexible connection between radiator and thermostat pumps to be provided by others.
19 Refer to Section 23 3113 – Facility Fuel Oil Piping.
- 20 C. Exhaust System:
- 21 1. Furnish critical type exhaust silencer:
- 22 a. Sized according to manufacturer's recommendations
- 23 b. Mount so weight is not supported by engine
- 24 c. Flexible exhaust fitting
- 25 d. Installation indoors by Mechanical Contractor
- 26 e. Refer to Section 23 2113 – Hydronic Piping
- 27 2. Condensate Traps
- 28 a. Drain plug at low point of muffler
- 29 3. Thermal Expansion
- 30 a. Stainless steel exhaust flex to accommodate thermal growth and vibration isolation
- 31 4. Acceptable Back Pressure
- 32 a. Coordinate silencer exhaust pipe size with mechanical contractor so exhaust back pressure
33 does not exceed maximum limitations specified by generator set manufacturer.
- 34 5. Exhaust clearing area
- 35 D. Starting System
- 36 1. Provide DC electric starting system with positive engagement drive. Provide DC voltage
37 recommended by manufacturer.
- 38 2. Provide fully automatic start-stop controls.
- 39 3. Provide cycle cranking to open and lock out start circuit after 3 attempts to start failed engine start.
- 40 4. Batteries
- 41 a. Provide sealed lead-acid storage battery set:
- 42 1) Heavy duty diesel starting type
- 43 2) Voltage compatible with starting system voltage
- 44 3) Capacity to provide for 1-1/2 minutes total cranking time at 0°F without recharging. In
45 accordance with NFPA Level 1.
- 46 b. Provide vinyl coated steel battery rack.
- 47 c. Provide starting battery heater:
- 48 1) Heater plate under battery
- 49 2) Heater type blanket around battery case
- 50 3) Thermal switch - heater control relay
- 51 4) 120 VAC input
- 52 d. Battery cables and clamps
- 53 5. Battery Charger
- 54 a. Four Rate Battery Charger
- 55 1) Constant current, constant voltage, high rate taper, and float equalized.
- 56 b. Dual Rate Battery Charger
- 57 1) Constant current, and float equalized
- 58 c. Charger Accessories:
- 59 1) Overload protection
- 60 2) ±0.5% line and load regulation
- 61 3) Electronic current limit output 105%
- 62 4) DC ammeter and voltmeter

- 1 13. Alternator Components
2 a. Solid state design digital voltage regulator:
3 1) Performance
4 a) Microprocessor based control
5 b) Programmable
6 c) Regulation: $\pm 0.25\%$ at any constant load for any load from 0% to 100% of pf
7 rating.
8 d) 3 Ph, true RMS sensing
9 e) PMG input, engine unloading
10 f) Design insensitive to severe, load induced wave shape distortion from SCR or
11 thyristor circuits such as those used in battery charging, UPS, and motor speed
12 control equipment loads.
13 g) Controls to limit build-up of AC generator voltage to provide a linear rise and
14 limit overshoot.
15 h) Digital adjustments for out voltage adjustment gain, damping and frequency
16 rate-off
17 i) System setup controls and fault alarms.
18 2) Protection
19 a) Over-excitation protection
20 b) Electronic voltage buildup protection
21 c) Loss of sensing protection
22 d) Temperature compensation
23 e) Limitation of voltage overshoot on startup
24 3) Features
25 a) Parallel support
26 b) VAR/PF control
27 4) Environmentally sealed
28 5) UL 508A listing
29 b. Output Circuit Breaker(s)
30 1) (3) 100% circuit breakers – LSI type, 1000A and greater to be LSIA
31 a) Breakers shall be selected to selectively coordinate with downstream circuit
32 breakers per specification section 26 0573 Power System Studies. Breakers
33 which do not selectively coordinate shall be replaced with new at contractor's
34 expense.
35 2) Adjustable long time, long time delay, short time, and short time delay curve shaping
36 elements
37 3) Shunt Trip for integration with load bank controls (Load bank breaker shall be shunt
38 trip type)
39 4) Solid state trip fixed mounted insulated case generator mounted circuit breaker
40 5) NEC required access in front of breaker
41 6) Ground fault alarm only: Monitoring relay for breaker 1000A and above. Relay to be
42 adjustable from 3.8 – 1200A and include an adjustable time delay of 0-10S.
43 G. Controls:
44 1. NFPA 110 listed
45 2. Micro-processor based solid state controls to automatically start, protect and monitor engine-
46 generator set with panel illuminating lighting and digital display.
47 3. Control panel includes:
48 a. Solid state trip main circuit breaker
49 b. Motor starting switch
50 c. Electrically operated fuel control
51 d. Relay to disconnect battery charger during cranking
52 e. Switching lamps and meters to be oil tight and dust tight. All active components to be installed
53 within a NEMA 1 enclosure. There shall be no exposed components with door open operating
54 750 V.
55 f. Protective relays to open main circuit breaker and shut down and lockout engine on abnormal
56 conditions including:
57 1) Overspeed
58 2) Operation of Remote Stop
59 3) Overcrank (alarm only when fire pump is operating)
60 4) Low lube oil pressure (alarm only when fire pump is operating)
61 5) High Engine Temp (alarm only when fire pump is operating)
62 6) Low coolant level (alarm only when fire pump is operating)

- 1 5. Audible alarm shall include silencing circuit, which, after activation, will permit annunciation of
2 subsequent failures.
3
4 6. Control Panel mounting:
5 a. Mounted on engine generator set in NEMA 1 enclosure on shock isolators
6 7. Wall mounted in NEMA 1 enclosure
7 7. Free standing in NEMA 1 enclosure
8 7. Provide remote annunciator panel
9 a. Compliant with NFPA Level 1 requirements.
10 H. Isolate engine generator set from building structure and from connecting services.
11 1. Separately derived grounding system. Connect generator ground as shown on drawings to
12 grounding electrode system.
13 I. Termination Bars and Connections:
14 1. Silver- or tin-plated copper bus bars for terminating cables.
15 2. Standard NEMA standard bolt hole spacing, for 3 Ph and neutral, within generator connection box
16 with gasketed bolt on cover.
17 3. Engine-generator set control interfaces to other system components to be made on a permanently
18 labeled terminal block assembly. Provide labels describing connection points.
19 4. Connections to engine-generator set: Flexible or isolation type connections. Include electrical, fuel,
20 exhaust, and ventilation connections.
21 J. Equipment Bases:
22 1. Mount complete unit on a structural steel sub-base, rectangular in shape, with sufficient rigidity to
23 maintain alignment of generator set. Provide perimeter beams with minimum depth equal to 1/10 of
24 longest dimension of base, except beam depth need not exceed 14" provided that deflection and
25 misalignment are kept within acceptable limits as determined by manufacturer. Engine-generator
26 set to be statically and dynamically balanced at factory. Peak-to-peak amplitude of vibration velocity
27 in horizontal, vertical, and axial direction shall not exceed 0.65" per second at main structural
28 components.
29 2. Engine-generator set weight distribution is to be considered to provide uniform deflections.
30 3. Bases shall provide equipment alignment and assure uniform weight distribution. Provide side
31 brackets on bases to contain isolating mounts and reduce total installed heights of equipment.
32 K. Vibration Isolators:
33 1. Required between the structural steel sub-base and concrete housekeeping pad.
34 2. Steel or cast iron top and bottom housings incorporating 1 or more steel springs with built-in leveling
35 bolts and built-in resilient chocks to control oscillation and withstand lateral forces in all directions.
36 L. Fuel System
37 1. Day Tank provided under specification section 231214 Liquid Fuel Systems
38 M. Load bank tap box:
39 1. Manufacturer: Powertron or engineer approved equal
40 2. UL listed
41 3. Wall mount, NEMA 3R
42 4. Front lockable access door
43 5. Mechanical set screw lugs
44 6. Integral GFCI receptacle
45 7. Remote start/stop terminals
46 8. Cam-Lock male receptacles
47 9. Power distribution block
10. 480V, 800A

48 2.4 INTERFACE WITH BUILDING MANAGEMENT SYSTEM (BMS)

- 49 A. Interface shall be as follows:
50 1. Control panel shall incorporate communication module with digital communication port connection to
51 building automation system (BAS) via BACnet Ethernet communication.
52 2. Communications shall be for the following:

TYPE	CONDITION/DESCRIPTION	RANGE/UNITS
LDI 1	Low lube oil pressure prealarm	
LDI 2	Low water temperature	
LDI 3	High engine temperature prealarm	
LDI 4	Battery charger AC failure	
LDI 6	Control switch not in automatic position	
LDI 7	High battery voltage	
LDI 8	Low coolant level	

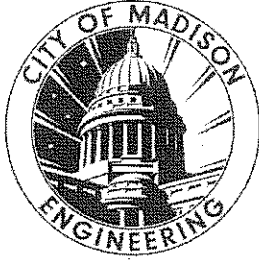
1 B. Perform Acceptance Testing in accordance with Section 26 0812 - Power Distribution Acceptance Tests and
2 Section 26 0813 - Power Distribution Acceptance Test Tables.

3 3.3 LOAD TEST

- 4 A. Conduct load testing of engine-generator set, under direct supervision of factory-authorized representatives
5 of manufacturers of engine-generator set and auto-transfer switch.
6 B. Tests to include minimum of 10 starts of engine-generator set, minimum of 10 operations of auto-transfer
7 switch, 8 h maintained operation under conditions of randomly applied loads at 10 to 100% of rated capacity.
8 1. Loading shall be by use of load banks.
9 C. Provide complete results of testing, including frequency and voltage regulation at 25, 50, 75, and 100% of
10 rated load, fuel consumption and exhaust emissions at the above load ratings, actual measured values for
11 delay and drop out relays for ATS, measured values for time delay relays.
12 D. Engine-generator set test results are to be certified to comply with specification parameters or necessary
13 corrective actions implemented and tests repeated until compliance is certified.
14 E. At conclusion of testing, service engine-generator set including replacing air, oil and fuel filters, changing
15 lubrication oil, checking and refilling batteries, adjusting fan belts for proper tightness, and refilling of cooling
16 system as required.
17 F. Provide fuel for load testing of engine-generator set.

18 END OF SECTION

19



Department of Public Works

Engineering Division

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

City-County Building, Room 115
210 Martin Luther King, Jr. Boulevard
Madison, Wisconsin 53703
Phone: (608) 266-4751
Fax: (608) 264-9275
engineering@cityofmadison.com
www.cityofmadison.com/engineering

Assistant City Engineer

Gregory T. Fries, P.E.

Principal Engineer 2

Christopher J. Petykowski, P.E.

Principal Engineer 1

Christina M. Bachmann, P.E.

Eric L. Dundee, P.E.

John S. Fahrney, P.E.

Facilities & Sustainability

Jeanne E. Hoffman, Manager

Operations Manager

Kathleen M. Cryan

Mapping Section Manager

Eric T. Pederson, P.S.

Financial Manager

Steven B. Danner-Rivers

August 2, 2017

NOTICE OF ADDENDUM ADDENDUM NO. 4

CONTRACT NO. 7952 JUDGE DOYLE GARAGE

Revise and amend the contract document(s) for the above project as stated in this addendum, otherwise, the original document shall remain in effect.

Please acknowledge this addendum on page E1 of the contract documents and/or in Section E: Bidder's Acknowledgement on Bid Express.

Electronic version of these documents can be found on the Bid Express web site at:

<http://www.bidexpress.com>

If you are unable to download plan revisions associated with the addendum, please contact the Engineering office at 608-266-4751 receive the material by another route.

Sincerely,

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

Cc: Gregory T. Fries, P.E.

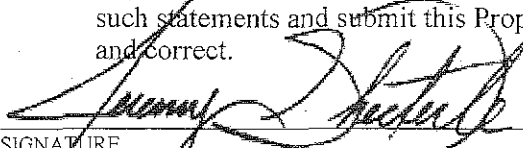
SECTION E: BIDDERS ACKNOWLEDGEMENT

CONTRACT TITLE: JUDGE DOYLE SQUARE PUBLIC PARKING FACILITY

CONTRACT NO. 7952

Bidder must state a Unit Price and Total Bid for each item. The Total Bid for each item must be the product of quantity, by Unit Price. The Grand Total must be the sum of the Total Bids for the various items. In case of multiplication errors or addition errors, the Grand Total with corrected multiplication and/or addition shall determine the Grand Total bid for each contract. The Unit Price and Total Bid must be entered numerically in the spaces provided. All words and numbers shall be written in ink.

1. The undersigned having familiarized himself/herself with the Contract documents, including Advertisement for Bids, Instructions to Bidders, Form of Proposal, City of Madison Standard Specifications for Public Works Construction - 2017 Edition thereto, Form of Agreement, Form of Bond, and Addenda issued and attached to the plans and specifications on file in the office of the City Engineer, hereby proposes to provide and furnish all the labor, materials, tools, and expendable equipment necessary to perform and complete in a workmanlike manner the specified construction on this project for the City of Madison; all in accordance with the plans and specifications as prepared by the City Engineer, including Addenda to the Contract Nos. 1 through 4 issued thereto, at the prices for said work as contained in this proposal. (Electronic bids submittals shall acknowledge addendum under Section E and shall not acknowledge here)
2. If awarded the Contract, we will initiate action within seven (7) days after notification or in accordance with the date specified in the contract to begin work and will proceed with diligence to bring the project to full completion within the number of work days allowed in the Contract or by the calendar date stated in the Contract.
3. The undersigned Bidder or Contractor certifies that he/she is not a party to any contract, combination in form of trust or otherwise, or conspiracy in restraint of trade or commerce or any other violation of the anti-trust laws of the State of Wisconsin or of the United States, with respect to this bid or contract or otherwise.
4. I hereby certify that I have met the Bid Bond Requirements as specified in Section 102.5. *(IF BID BOND IS USED, IT SHALL BE SUBMITTED ON THE FORMS PROVIDED BY THE CITY. FAILURE TO DO SO MAY RESULT IN REJECTION OF THE BID).*
5. I hereby certify that all statements herein are made on behalf of J.P. Cullen & Sons, Inc., (name of corporation, partnership, or person submitting bid) a corporation organized and existing under the laws of the State of Wisconsin a partnership consisting of _____; an individual trading as _____; of the City of Janesville, State of Wisconsin, that I have examined and carefully prepared this Proposal, from the plans and specifications and have checked the same in detail before submitting this Proposal; that I have fully authority to make such statements and submit this Proposal in (its, their) behalf; and that the said statements are true and correct.

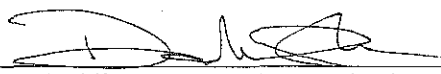


 SIGNATURE

Jeremy J. Shecterle, Vice President

 TITLE, IF ANY

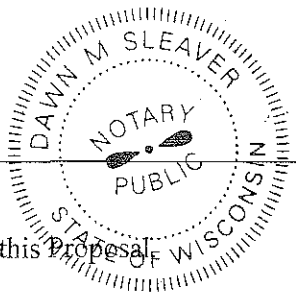
Sworn and subscribed to before me this 4th day of August, 2017.



 (Notary Public or other officer authorized to administer oaths)

My Commission Expires Feb. 5, 2021

Bidders shall not add any conditions or qualifying statements to this Proposal.



SECTION F: BEST VALUE CONTRACTING

CONTRACT NO. 7952

Best Value Contracting

1. The Contractor shall indicate the non-apprenticeable trades used on this contract.

NONE

2. Madison General Ordinance (M.G.O.), 33.07(7), does provide for some exemptions from the active apprentice requirement. Apprenticeable trades are those trades considered apprenticeable by the State of Wisconsin. Please check applicable box if you are seeking an exemption.

- Contractor has a total skilled workforce of four or less individuals in all apprenticeable trades combined.
- No available trade training program; The Contractor has been rejected by the only available trade training program, or there is no trade training program within 90 miles.
- Contractor is not using an apprentice due to having a journey worker on layoff status, provided the journey worker was employed by the contractor in the past six months.
- First-time Contractor on City of Madison Public Works contract requests a onetime exemption but intends to comply on all future contracts and is taking steps typical of a "good faith" effort.
- Contractor has been in business less than one year.
- Contractor doesn't have enough journeyman trade workers to qualify for a trade training program in that respective trade.
- An exemption is granted in accordance with a time period of a "Documented Depression" as defined by the State of Wisconsin.

3. The Contractor shall indicate on the following section which apprenticeable trades are to be used on this contract. Compliance with active apprenticeship, to the extent required by M.G.O. 33.07(7), shall be satisfied by documentation from an applicable trade training body; an apprenticeship contract with the Wisconsin Department of Workforce Development or a similar agency in another state; or the U.S Department of Labor. This documentation is required prior to the Contractor beginning work on the project site.

- The Contractor has reviewed the list and shall not use any apprenticeable trades on this project.

LIST APPRENTICABLE TRADES (check all that apply to your work to be performed on this contract)

- BRICKLAYER
- CARPENTER
- CEMENT MASON / CONCRETE FINISHER
- CEMENT MASON (HEAVY HIGHWAY)
- CONSTRUCTION CRAFT LABORER
- DATA COMMUNICATION INSTALLER
- ELECTRICIAN
- ENVIRONMENTAL SYSTEMS TECHNICIAN / HVAC SERVICE TECH/HVAC INSTALL / SERVICE
- GLAZIER
- HEAVY EQUIPMENT OPERATOR / OPERATING ENGINEER
- INSULATION WORKER (HEAT & FROST)
- IRON WORKER
- IRON WORKER (ASSEMBLER, METAL BLDGS)
- PAINTER & DECORATOR
- PLASTERER
- PLUMBER
- RESIDENTIAL ELECTRICIAN
- ROOFER & WATER PROOFER
- SHEET METAL WORKER
- SPRINKLER FITTER
- STEAMFITTER
- STEAMFITTER (REFRIGERATION)
- STEAMFITTER (SERVICE)
- TAPER & FINISHER
- TELECOMMUNICATIONS (VOICE, DATA & VIDEO) INSTALLER-TECHNICIAN
- TILE SETTER

CONTRACT NO. 7952

Small Business Enterprise Compliance Report

This information may be submitted electronically through Bid Express or submitted with bid in sealed envelope.

Cover Sheet

Prime Bidder Information

Company:	J.P. Cullen & Sons, Inc.
Address:	330 E. Delavan Drive, Janesville, WI 53546
Telephone Number:	608-754-6601
Fax Number:	608-754-9171
Contact Person/Title:	Jeremy J. Shecterle, Vice President

Prime Bidder Certification

Name:	Jeremy J. Shecterle
Title:	Vice President
Company:	J.P. Cullen & Sons, Inc.

I certify that the information contained in this SBE Compliance Report is true and correct to the best of my knowledge and belief.

Mally Hawkins
Witness Signature

Jeremy J. Shecterle
Bidder's Signature

8-4-17
Date

PROPOSAL

Judge Doyle Garage

PROJECT 11471 - CONTRACT NO. 7952

ITEM	DESCRIPTION	ESTIMATED		TOTAL BID
90001	Base Bid	1.00	Lump Sum	29,573,208
90002	ALTERNATE NO. 1: Add crystalline concrete add mixture to the concrete mix for the structural decks.	1.00	Lump Sum	395,645

GRAND TOTAL 29,968,853

NOTE: The bidder must completely fill in the base bid and the alternate. If any responsible bidder submits a base bid plus alternate one (1) that is below the Construction Budget Dollar Value, the City will award the contract based on the base bid plus alternate one (1). If no responsible bidder submits a base bid plus alternate one (1) that is below the Construction Budget Dollar Value, the City will award the contract based on the base bid only. The City shall have the right to proceed or not proceed with alternate one (1) regardless of how the bid was awarded. The City shall have the right to reject all bids regardless of the value of the bids submitted.

J.P. Cullen & Sons, Inc.

 FIRM NAME

Jeremy J. Shecterle, Vice President

 BIDDER'S PRINTED NAME

August 4, 2017

 DATE



 BIDDER'S SIGNATURE

SECTION G: BID BOND

KNOW ALL MEN BY THESE PRESENT, THAT Principal and Surety, as identified below, are held and firmly bound unto the City of Madison, (hereinafter referred to as the "Obligee"), in the sum of five per cent (5%) of the amount of the total bid or bids of the Principal herein accepted by the Oblige, for the payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.


The conditions of this obligation are such that, whereas the Principal has submitted, to the City of Madison a certain bid, including the related alternate, and substitute bids attached hereto and hereby made a part hereof, to enter into a contract in writing for the construction of:

JUDGE DOYLE GARAGE CONTRACT NO. 7952

1. If said bid is rejected by the Oblige, then this obligation shall be void.
2. If said bid is accepted by the Oblige and the Principal shall execute and deliver a contract in the form specified by the Oblige (properly completed in accordance with said bid) and shall furnish a bond for his/her faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said bid, then this obligation shall be void.

If said bid is accepted by the Oblige and the Principal shall fail to execute and deliver the contract and the performance and payment bond noted in 2. above executed by this Surety, or other Surety approved by the City of Madison, all within the time specified or any extension thereof, the Principal and Surety agree jointly and severally to forfeit to the Oblige as liquidated damages the sum mentioned above, it being understood that the liability of the Surety for any and all claims hereunder shall in no event exceed the sum of this obligation as stated, and it is further understood that the Principal and Surety reserve the right to recover from the Oblige that portion of the forfeited sum which exceed the actual liquidated damages incurred by the Oblige.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by an extension of the time within which the Oblige may accept such bid, and said Surety does hereby waive notice of any such extension.

TRAVELERS 

POWER OF ATTORNEY

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company

St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

Attorney-In Fact No. 230589

Certificate No. 007077495

KNOW ALL MEN BY THESE PRESENTS: That Farmington Casualty Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company are corporations duly organized under the laws of the State of Connecticut, that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc., is a corporation duly organized under the laws of the State of Wisconsin (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint

John W. Walsh, Betsy K. Wright, Tina L. Domask, and Ross S. Squires

of the City of Middleton, State of Wisconsin, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.


IN WITNESS WHEREOF, the Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this 21st day of December, 2016

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company

St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
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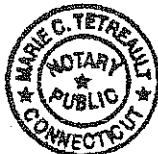


State of Connecticut
City of Hartford ss.

By: 
Robert L. Raney, Senior Vice President

On this the 21st day of December, 2016, before me personally appeared Robert L. Raney, who acknowledged himself to be the Senior Vice President of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.
My Commission expires the 30th day of June, 2021.




Marie C. Tetreault, Notary Public

SECTION H: AGREEMENT

THIS AGREEMENT made this 6th day of September in the year Two Thousand and Seventeen between J. P. CULLEN & SONS, INC. hereinafter called the Contractor, and the City of Madison, Wisconsin, hereinafter called the City.

WHEREAS, the Common Council of the said City of Madison under the provisions of a resolution adopted SEPTEMBER 5, 2017, and by virtue of authority vested in the said Council, has awarded to the Contractor the work of performing certain construction.

NOW, THEREFORE, the Contractor and the City, for the consideration hereinafter named, agree as follows:

1. **Scope of Work.** The Contractor shall, perform the construction, execution and completion of the following listed complete work or improvement in full compliance with the Plans, Specifications, Standard Specifications, Supplemental Specifications, Special Provisions and contract; perform all items of work covered or stipulated in the proposal; perform all altered or extra work; and shall furnish, unless otherwise provided in the contract, all materials, implements, machinery, equipment, tools, supplies, transportation, and labor necessary to the prosecution and completion of the work or improvements:

JUDGE DOYLE GARAGE CONTRACT NO. 7952

2. **Completion Date/Contract Time.** Construction work must begin within seven (7) calendar days after the date appearing on mailed written notice to do so shall have been sent to the Contractor and shall be carried on at a rate so as to secure full completion SEE SPECIAL PROVISIONS, the rate of progress and the time of completion being essential conditions of this Agreement.
3. **Contract Price.** The City shall pay to the Contractor at the times, in the manner and on the conditions set forth in said specifications, the sum of TWENTY-NINE MILLION NINE HUNDRED SIXTY-EIGHT THOUSAND EIGHT HUNDRED FIFTY-THREE AND NO/100 (\$29,968,853.00) Dollars being the amount bid by such Contractor and which was awarded to him/her as provided by law.
4. **Affirmative Action.** In the performance of the services under this Agreement the Contractor agrees not to discriminate against any employee or applicant because of race, religion, marital status, age, color, sex, disability, national origin or ancestry, income level or source of income, arrest record or conviction record, less than honorable discharge, physical appearance, sexual orientation, gender identity, political beliefs, or student status. The Contractor further agrees not to discriminate against any subcontractor or person who offers to subcontract on this contract because of race, religion, color, age, disability, sex, sexual orientation, gender identity or national origin.

The Contractor agrees that within thirty (30) days after the effective date of this agreement, the Contractor will provide to the City Affirmative Action Division certain workforce utilization statistics, using a form to be furnished by the City.

If the contract is still in effect, or if the City enters into a new agreement with the Contractor, within one year after the date on which the form was required to be provided, the Contractor will provide updated workforce information using a second form, also to be furnished by the City. The second form will be submitted to the City Affirmative Action Division no later than one year after the date on which the first form was required to be provided.

The Contractor further agrees that, for at least twelve (12) months after the effective date of this contract, it will notify the City Affirmative Action Division of each of its job openings at facilities in Dane County for which applicants not already employees of the Contractor are to be considered.

2. Declare the Contractor ineligible for further City contracts until the Affirmative Action requirements are met.
3. Recover on behalf of the City from the prime Contractor 0.5 percent of the contract award price for each week that such party fails or refuses to comply, in the nature of liquidated damages, but not to exceed a total of five percent (5%) of the contract price, or five thousand dollars (\$5,000), whichever is less. Under public works contracts, if a subcontractor is in noncompliance, the City may recover liquidated damages from the prime Contractor in the manner described above. The preceding sentence shall not be construed to prohibit a prime Contractor from recovering the amount of such damage from the non-complying subcontractor.

Article VIII

The Contractor shall include the above provisions of this contract in every subcontract so that such provisions will be binding upon each subcontractor. The Contractor shall take such action with respect to any subcontractor as necessary to enforce such provisions, including sanctions provided for noncompliance.

Article IX

The Contractor shall allow the maximum feasible opportunity to small business enterprises to compete for any subcontracts entered into pursuant to this contract. (In federally funded contracts the terms "DBE, MBE and WBE" shall be substituted for the term "small business" in this Article.)

5. **Substance Abuse Prevention Program Required.** Prior to commencing work on the Contract, the Contractor, and any Subcontractor, shall have in place a written program for the prevention of substance abuse among its employees as required under Wis. Stat. Sec. 103.503.
6. **Contractor Hiring Practices.**

Ban the Box - Arrest and Criminal Background Checks. (Sec. 39.08, MGO)

This provision applies to all prime contractors on contracts entered into on or after January 1, 2016, and all subcontractors who are required to meet prequalification requirements under MGO 33.07(7)(I), MGO as of the first time they seek or renew pre-qualification status on or after January 1, 2016. The City will monitor compliance of subcontractors through the pre-qualification process.

- a. **Definitions.** For purposes of this section, "Arrest and Conviction Record" includes, but is not limited to, information indicating that a person has been questioned, apprehended, taken into custody or detention, held for investigation, arrested, charged with, indicted or tried for any felony, misdemeanor or other offense pursuant to any law enforcement or military authority.

"Conviction record" includes, but is not limited to, information indicating that a person has been convicted of a felony, misdemeanor or other offense, placed on probation, fined, imprisoned or paroled pursuant to any law enforcement or military authority.

"Background Check" means the process of checking an applicant's arrest and conviction record, through any means.

- b. **Requirements.** For the duration of this Contract, the Contractor shall:
 1. Remove from all job application forms any questions, check boxes, or other inquiries regarding an applicant's arrest and conviction record, as defined herein.

JUDGE DOYLE GARAGE
CONTRACT NO. 7952

IN WITNESS WHEREOF, the Contractor has hereunto set his/her hand and seal and the City has caused these presents to be sealed with its corporate seal and to be subscribed by its Mayor and City Clerk the day and year first above written.

Countersigned:

J. P. CULLEN & SONS, INC.

Company Name


Witness Date 9-6-17


President Date 9-6-2017

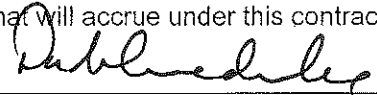

Witness Date 9/6/17


Secretary Date 9/6/17

CITY OF MADISON, WISCONSIN

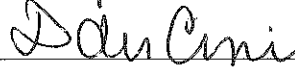
Provisions have been made to pay the liability that will accrue under this contract.

Approved as to form:

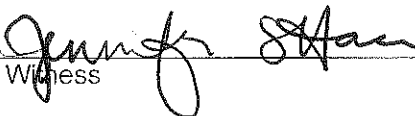

Finance Director


City Attorney

Signed this 15th day of September, 2017


Witness


Mayor Date 9.15.17


Witness


City Clerk Date 9-12-2017

SECTION I: PAYMENT AND PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we J. P. CULLEN & SONS, INC. as principal, and TRAVELERS CASUALTY AND SURETY COMPANY OF AMERICA

Company of Hartford, CT as surety, are held and firmly bound unto the City of Madison, Wisconsin, in the sum of TWENTY-NINE MILLION NINE HUNDRED SIXTY-EIGHT THOUSAND EIGHT HUNDRED FIFTY-THREE AND NO/100 (\$29,968,853.00) Dollars, lawful money of the United States, for the payment of which sum to the City of Madison, we hereby bind ourselves and our respective executors and administrators firmly by these presents.

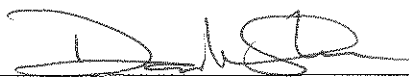
The condition of this Bond is such that if the above bounden shall on his/her part fully and faithfully perform all of the terms of the Contract entered into between him/herself and the City of Madison for the construction of:

JUDGE DOYLE GARAGE
CONTRACT NO. 7952

in Madison, Wisconsin, and shall pay all claims for labor performed and material furnished in the prosecution of said work, and save the City harmless from all claims for damages because of negligence in the prosecution of said work, and shall save harmless the said City from all claims for compensation (under Chapter 102, Wisconsin Statutes) of employees and employees of subcontractor, then this Bond is to be void, otherwise of full force, virtue and effect.

Signed and sealed this 6th day of September, 2017

Countersigned:



Witness



Secretary

J. P. CULLEN & SONS, INC.


Company Name (Principal)



President

Seal

Approved as to form:



City Attorney


Travelers Casualty and Surety Company of America

Surety

Seal

Salary Employee

Commission

By 

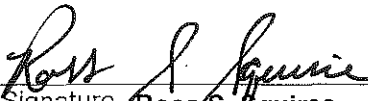
Attorney-in-Fact

Ross S. Squires

This certifies that I have been duly licensed as an agent for the above company in Wisconsin under National Producer Number 8729812 for the year 2017, and appointed as attorney-in-fact with authority to execute this payment and performance bond which power of attorney has not been revoked.

September 6, 2017

Date



Agent Signature

Ross S. Squires



POWER OF ATTORNEY

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company

St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

Attorney-In Fact No. 230589

Certificate No. 007077517

KNOW ALL MEN BY THESE PRESENTS: That Farmington Casualty Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company are corporations duly organized under the laws of the State of Connecticut, that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc., is a corporation duly organized under the laws of the State of Wisconsin (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint

John W. Walsh, Betsy K. Wright, Tina L. Domask, and Ross S. Squires

of the City of Middleton, State of Wisconsin, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this 21st day of December, 2016.

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company

St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company



State of Connecticut
City of Hartford ss.

By: [Signature]
Robert L. Raney, Senior Vice President

On this the 21st day of December, 2016, before me personally appeared Robert L. Raney, who acknowledged himself to be the Senior Vice President of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.
My Commission expires the 30th day of June, 2021.



[Signature]
Marie C. Tetreault, Notary Public