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September 18, 2020

**NOTICE OF ADDENDUM
ADDENDUM NO. 3
City of Madison, Engineering Division**

**CONTRACT NO. 8916
GATES OF HEAVEN EXTERIOR RESTORATION**

This addendum is issued to modify, explain or correct the original Drawings, Specifications, or Contract Documents marked as *Gates of Heaven Exterior Restoration City of Madison, Contract #8916* and is hereby made a part of the contract documents.

This addendum consists of general project changes and answers to questions asked by interested bidders during the bidding process as follows:

- Issue 1: Mortar type is being changed from 3.5 NHL to 2.0 NHL. A revised Specification section is attached.
- Question 1: Has the prescribed stone cleaning method been tested?
Answer 1: A light pressure wash is being specified. This method has not been tested.
- Question 2: Who is the warranted Roofing Contractor that should be contacted?
Answer 2: Maly Roofing. Contact Leroy Krapohl at 608-852-1571 or steepslope@malyroofing.com.
- Question 3: Sections 01 74 13 Progress Cleaning and 01 77 00 Closeout Procedures reference attic stock. Please confirm that there are no attic stock requirements for the project.
Answer 3: There is no attic stock requirement; however, the intent is for any unused materials to be left with the Owner at project completion. Those items may include replacement stone that was purchased for the project and not used, fabric of the existing stone that was not reused in the project, and unopened cans of paint.

Acknowledge this addendum in Section E on page E-1: Bidder's Acknowledgement on Bid Express.

Electronic version of these documents can be found on Bid Express at <https://www.bidexpress.com/> and the City of Madison web site at <http://www.cityofmadison.com/business/PW/contracts/openforBid.cfm>.

For questions regarding this bid, contact:

Amy Scanlon, Project Manager

PH: 608-267-0743

Email: ascanlon@cityofmadison.com

Sincerely,

A handwritten signature in black ink, appearing to read "Robert Phillips". The signature is stylized with large, flowing loops.

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

1 PART 1: GENERAL

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1.1. SCOPE

- a. The work under this section shall consist of providing all materials, labor, equipment, tools, protection and supervision necessary to complete the work.

1.2. RELATED WORK

- a. Applicable provisions of Division 1 shall govern work under this Section.

1.3. DESCRIPTION

- a. In addition to all other requirements, all work of this Section shall be performed under the guidelines of the Secretary of the Interior's Standards for the Treatment of Historic Properties and must comply with the Secretary of the Interior's Standards for Rehabilitation.
- b. The intent of this Section is:
 - i. If the work is expected to extend into conditions where the average low temperature is less than 45 degrees Fahrenheit (for the city of Madison, Wisconsin: November 15 - May 1), scaffolding shall be fully tented utilizing a reinforced and grommated scaffold enclosure system capable of withstanding all weather conditions including high winds such as Monarflex, Eagle or approved equal.
 - 1. This is to provide a consistent environment for the work, which shall be executed continuously until completion.
 - 2. Heat may be required depending on weather, enclosure shall be able to be heated without modification.
 - 3. The cost to erect and to heat will be the responsibility of the Contractor should it be shown that the Work Schedule has not been met due to Contractor related causes
 - ii. Training for the methods described below is part of the Contract and shall be included in the Bid and shall be administered by the Architect. The Historic Masonry Consultant/Certified Trainer (CT), while being paid via the Contract will act only in the Owner's behalf in conjunction with the Architect.
 - iii. Repoint the historic masonry walls to arrest water infiltration.
 - 1. Provide adequate backing for the repointing mortar to perform, long-term in the conditions specific to this site.
 - 2. Final point the wall (2.5X the width of the mortar joint) in two lifts using NHL 2.0 as specified herein.
 - iv. To carefully deconstruct limited areas of the existing wall as required by the conditions.
 - v. To save as much of the historic material as possible.
 - vi. To repair all deteriorated stone that is deemed to be suitable for reuse.
 - vii. That all repair and replacement materials will match historic construction in all physical and visual aspects, including material, form, color, texture, and workmanship.
 - viii. That all work will be done using the gentlest methods available.
 - ix. That sound historical materials will not be put at risk due to the work of this Section.
- c. Work includes, but is not limited to, the following:
 - i. Repointing of all stone masonry as shown on the drawings.
 - ii. Removal of previous cement-based coatings as shown on the drawings.
 - iii. Final cleaning of all masonry surfaces upon completion of the repair work. 100% cleaning of the stone is a requirement of this bid. Final cleaning method will be confirmed onsite at the time of commencement. For the purposes of this bid assume a very low-pressure steam wash of all exposed surfaces.
 - iv. Installation of a penetrating, breathable, non-film-forming and non-darkening stone consolidant and water repellent.

1.4. QUALITY ASSURANCE

- a. **Pre-Construction Conference:** Prior to beginning the work of this Section Masonry Contractor shall convene a meeting with the Architect and Owner's Representative(s) to review the requirements of the Quality Assurance Plan, Project Training Program, installation procedures, location of required test areas, and all job conditions and processes.
- b. **Quality Assurance Plan:** **Prior to beginning Work, submit a written Quality Assurance Plan to Architect and Owner for review and approval. Allow 2 weeks for review and approval**

64 **process. Do not proceed without written approval of plan.** The Owner's Quality Control
65 Representative and the Architect shall review work on a regular basis for conformance with the
66 approved Quality Assurance Plan. Quality Assurance Plan shall, at a minimum, include the
67 following items:

68 **i. Description of Training Program**

- 69 1. Include certificate issuer name and qualifications with the specific requisites
70 established to meet the Historic Material Restoration Requirements (HMRR)
71 identified in the project documents.
- 72 2. Identify the classroom curriculum and/or outline for the Architect's review
73 and approval.
- 74 3. Provide a sample classroom examination
- 75 4. Identify the field work verification process and confirm location and scope of
76 all mock-ups for Architect's review and approval.
- 77 5. Provide a list of all sub-contractor and/or other employees that will submit to
78 the training and certification process.

79 **ii. Required Training:** Work methods that require training by the Certified Trainer (CT) in
80 coordination with the Architect are as follows:

- 81 1. Mortar Removal
- 82 2. Repointing Mortar Preparation
- 83 3. Repointing Mortar Installation
- 84 4. Substitute Stone Patch
- 85 5. Dutchman
- 86 6. Cleaning (as required for Consolidant and Water Repellant Installation)
- 87 7. Water Repellant Installation

88 **iii. Access:** Describe all methods of mobilization and access to work areas.

89 **iv. Dust Collection:** Describe methods of dust containment during the work of this section.

90 **v. Protection:** Describe the methods of protecting surrounding stone and landscape. Submit
91 drawings of protection when requested by Architect.

92 **vi. Means and Methods:** Describe the Work procedures, materials, and tools the contractor
93 proposes to use for each historic material restoration requirement specified.

94 **vii. Sequence:** Describe the sequence of historic material restoration requirements.

95 **viii. Adjustments for Weather:** Describe how the sequence of historic material restoration
96 requirements and the construction schedule changes as it relates to climate fluctuations
97 and protection of completed work.

98 **ix. Survey/Layout:** Describe the methods for surveying original layout and collecting datum
99 points and plumb lines for rebuilding stone masonry.

100 **x. Shoring:** Describe the methods for shoring and providing a safe working environment.

101 **xi. Deconstruction:** Describe the methods for deconstruction and tools for cleaning stone for
102 reuse.

- 103 1. Describe the methods for deconstruction of individual stone and tools for
104 cleaning the stone for reuse.
- 105 2. Describe the method and approach to cleaning cement-based coating
106 materials from the stone face.
- 107 3. Describe the complete stone removal procedures; include equipment,
108 approach and where (on-site or in shop) the stone will be redressed.

109 **c. Certified Trainer – CT:**

110 **i.** The Contractor shall secure and pay for the services of an independent CT to provide the
111 on-site project training certificate program.

- 112 1. The independent CT shall have 10 years of experience in historic masonry
113 work and be well-versed in the requirements of the Secretary of the Interior's
114 Standards for Rehabilitation as they relate to the work of this Section.
- 115 2. The CT will be responsible for issuing certificates and shall provide evidence
116 of training experience on 5 other projects of similar scope and scale.
- 117 3. Product manufacturers, vendors, distributors, or suppliers of materials
118 specified in this Section shall not be permitted to offer on-site project training
119 certificates.

120 **d. Project Training Program Definition and Use:**

121 **i.** All workers must obtain training certificate(s) in order to work on the project. Training
122 certificates are earned by individual workers and are issued with the understanding that
123 they are for limited time use for a specific historic masonry repair requirement.

- 124 1. The certificates cannot be earned by a company.
- 125 2. The certificates are non-transferable and only valid for the specific
126 rehabilitation treatment specified. For example: this project has defined

- 127 several rehabilitation treatments in the scope that will require separate on-
128 site training sessions for issuance of the required project training certificates.
129 3. The contractor has the flexibility to assign workers that are most proficient in
130 the skills required for the specified rehabilitation treatment. It is not
131 necessary, nor a requirement of this specification, that all workers obtain all
132 project training certificates offered. A laborer, for example, may need to
133 become proficient at historic material removal, documentation, and inventory
134 control, as well as mortar mixing, but not need to be qualified to set stone or
135 prepare stone surfaces for repair.
136 4. The contractor must assign workers to tasks that the workers are certified in
137 only. Non-certified tasks may be undertaken by any personnel.
138 5. The contractor in consultation with the Historic Masonry Consultant shall
139 develop a method for identifying workers and their certifications to aid in the
140 review of workers and their work.
141 ii. Owner reserves the right to remove any workers from the project site who does not meet
142 the standards and performance criteria as described in this section.
143 e. Stone Rehabilitation Firm Qualifications:
144 i. The masonry rehabilitation firm shall perform all work in this section. The firm shall have
145 completed work similar in material, design, and extent to that indicated for this Project and
146 shall demonstrate a record of successful in-service performance. Proven implementation
147 of the Secretary of the Interior's Standards for Rehabilitation: Preservation Briefs #1 and
148 #2 and compliance with TMS 402-08/ACI 530-08/ASCE 5-08 are required.
149 f. Field Supervision:
150 i. Masonry rehabilitation firms shall maintain an experienced full-time supervisor on the
151 Project site at all times when stone masonry rehabilitation is in progress. A single
152 individual shall be responsible for supervising the stone masonry rehabilitation work
153 throughout the duration of the Project.
154 g. Stone Rehabilitation Worker Qualifications:
155 i. Rehabilitation specialist firms must employ craftspersons who are experienced with and
156 specialize in rehabilitation work of the types they will be performing.
157 ii. All rehabilitation treatments must be performed by a project - certified craftsperson who is
158 familiar with historic stone construction. The Contractor shall provide proof of such
159 knowledge to the Architect by submitting a project training certificate for each worker for
160 each rehabilitation treatment to be assigned.
161 iii. Only skilled journeyman masons who are familiar with and experienced with the materials
162 and methods specified, and who have successfully obtained a Project Training Certificate
163 as defined herein and are familiar with the design requirements shall be used for the
164 scope of this Section.
165 h. Source Limitations:
166 i. Each type of material for stone rehabilitation shall be obtained from a single source with
167 resources sufficient to provide materials of consistent quality in color, texture, detailing,
168 appearance and physical properties.
169 i. Mock-ups:
170 i. All submittals as noted herein shall be submitted and approved prior to the creation of
171 mock-ups.
172 ii. Consult the Architect for placement, size, and location of mock-ups. Mock-ups shall
173 demonstrate to the Architect and Owner the methods and quality of workmanship to be
174 performed in all stone treatments.
175 iii. The Architect and the CT shall be onsite and will guide/direct the mock-up process.
176 iv. The mock-ups shall be installed and approved as part of the certification process required
177 under this contract; and shall be required only for those treatments that are included in this
178 scope of work.
179 v. Prepare mock-ups directly on the existing historic wall under the same weather conditions
180 expected during the remainder of the work.
181 vi. Throughout rehabilitation, retain approved mock-up panels in undisturbed condition,
182 suitably marked, as a standard for judging completed work.
183 1. There shall be one approved mock-up for every worker and every treatment
184 for which they are certified.
185 vii. Mock-ups shall include separate treatments, as called out on the drawings and related
186 specification Sections, see Part 3 – Execution herein. These are as follows:
187 1. Repointing Mortar Preparation and Installation - Repoint mortar joints, 8 feet
188 in length and two (2) courses high. (Training and Certification for this task is
189 required)

- 190 2. Dutchman (As-needed basis only, by change-order if required)- Undertake
- 191 Dutchman repairs in two (2) locations, including one that is only cut and
- 192 prepared for application. (Training and Certification for this task is required)
- 193 3. Cleaning – Cleaning will be required as part of the consolidant and water
- 194 repellent installation process (follow the materials' manufacturers'
- 195 requirements at all times)
- 196 4. Stone consolidant installation – Provide mock-up of installed stone
- 197 consolidant limited to a 4' X 4" area of properly restored and cleaned stone
- 198 wall, near grade including both stone types.
- 199 5. Mortar removal
- 200 6. Patch material removal
- 201 7. Redress
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1.5. SUBMITTALS

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- 204
- 205 a. Submit the following items in time to prevent delay of the work and to allow adequate time for
- 206 review. Do not order materials or start work before receiving written approval.
- 207 i. All testing shall be coordinated by: John Lambert, 681 South 4050 West, Salt Lake City,
- 208 UT 84104; (801) 509-5099 email: john@masonry-restoration.com
- 209 ii. Preferred Laboratory Vendor (on an as-needed basis only): AMT Laboratories • 3741
- 210 Greenway Circle • Lawrence, Kansas 66046 • (888) 376-3600
- 211 b. Quality Assurance Plan
- 212 i. Submit written plan as outlined in the Quality Assurance Section for the work of this
- 213 Section.
- 214 c. Historic Masonry Consultant – Training Program Instructor
- 215 i. Preferred Vendor: John Lambert, Historic Masonry Trainer/Abstract Masonry Restoration,
- 216 Inc., 681 South 4050 West, Salt Lake City, UT 84104; (801) 509-5099 email:
- 217 john@masonry-restoration.com
- 218 ii. Other vendors may be considered but must be vetted and approved by the Architect
- 219 PRIOR to submitting bid. No substitutions will be allowed after the Bid due date.
- 220 1. Project Training Program Plan
- 221 a. Submit written documentation of a training certificate program which
- 222 complies with ASTM E2659-09 Standard Practice for Certificate Programs
- 223 specific to the rehabilitation treatment requirements of this project. At a
- 224 minimum the training program shall include all stone treatment requirements
- 225 listed on the drawings and the removal of both cement-based mortars and
- 226 lime mortar and installation of lime mortar. The documentation shall include:
- 227 the number of learning events; a defined scope of training; a list of learning
- 228 objectives, outcomes, assessment, and evaluation; samples of written tests;
- 229 description of skills testing methodology; and requisites to obtain a
- 230 certificate.
- 231 2. Project Training Certificates
- 232 a. Submit written project training certificates from an independent Historic
- 233 Masonry Consultant – Training Program Instructor verifying that all workers,
- 234 installers, supervisors, project managers, and foremen have successfully
- 235 completed the requisites from the on-site training program specific to the
- 236 rehabilitation treatments assigned to them individually and as specified for
- 237 this project.
- 238 d. Stone Samples for Verification
- 239 i. Before erecting mockup, submit samples of the following:
- 240 1. Stone Replacement – Full New Stones – Full new stones shall meet
- 241 specification requirements for color texture, density, technical performance,
- 242 and stone type.
- 243 2. Stone Replacement – Cut Stones – Create each profile for review and
- 244 approval.
- 245 ii. Substitute Stone Repair Material – Provide at least two samples for patching material that
- 246 will match the existing stone. Patching shall match existing stone; therefore, multiple
- 247 submittals are expected. Substitute stone repair material will not be permitted to be
- 248 applied in missing areas of more than 2 inches deep.
- 249 iii. Qualification Data for Stone Rehabilitation Firm – The firm must submit written
- 250 documentation of at least five (5) individual projects completed in the last 15 years with at
- 251 least two (2) projects over \$1 million dollars for which they have been the primary masonry
- 252 specialist. Work must be performed by a contractor with 15 years of documented

- 253 successful experience in comparable historic stone masonry rehabilitation projects in size,
254 age and material and who employs personnel skilled in the rehabilitation treatments and
255 rehabilitation process and operations indicated.
- 256 1. The written submission must include the following:
 - 257 a. Name and address of project
 - 258 b. Name, address and phone numbers of Client
 - 259 c. Date of project completion
 - 260 d. Age of structure and whether it was listed on the National Register of
261 Historic Places or is designated as a Historic Landmark
 - 262 e. How the work scope was specifically delivered to comply with the
263 Secretary of the Interior's Standards for Rehabilitation.
 - 264 f. Size of the project, in terms of square feet of stone masonry restored
 - 265 g. List of materials (including names and manufacturers) used on project
 - 266 iv. Qualification Data for Stone Rehabilitation Field Supervisor –The firm must submit written
267 documentation of at least 5 projects that the Field Supervisor has supervised. The projects
268 may include those that were completed under the employment of a different firm. The list
269 must include projects that are similar in size, age and material to the current project. All
270 stone treatments must be performed and supervised by craftsmen whom are familiar
271 with historic stone masonry construction.
 - 272 a. The written submission must include the following:
 - 273 b. Name and address of project
 - 274 c. Name, address and phone numbers of Client
 - 275 d. Date of project completion
 - 276 e. Size of the project, in terms of square feet of stone masonry required
 - 277 f. List of materials (including names and manufacturers) used on project
 - 278 g. Name(s) of firm(s) the work was performed under, if different from
279 submitting firm
 - 280 h. Proof of expertise in historic stone masonry, as indicated by a
281 rehabilitation treatment certificate from the training program defined in
282 this specification
 - 283 v. Qualification Data for Stone Rehabilitation Workers – The firm must submit the name of
284 each craftsman who will be assigned to this project. Only skilled journeyman masons,
285 trained and certified by the historic masonry consultant, shall be used for masonry
286 rehabilitation. All stone treatments must be performed and supervised by craftsmen
287 who are familiar with historic stone masonry construction.
 - 288 a. Include the following:
 - 289 b. Name of craftsman
 - 290 c. Position craftsman will hold on this project
 - 291 d. Number of years working as a masonry rehabilitation specialist
 - 292 e. Proof of expertise in historic stone masonry, as indicated by a project
293 certificate from the training program defined in this specification
 - 294 f. Submit digital photographic documentation proposed procedures

295 1.6. SUBSTITUTIONS

- 296 a. If alternatives to the methods and materials indicated are proposed for any phase of rehabilitation
297 work, the Contractor shall provide written descriptions and programs of testing and install all test
298 panel samples and mock-ups to demonstrate the effectiveness of the alternatives for use on this
299 project.
- 300 b. The Contractor must provide documentation showing compliance with the requirements for
301 substitutions and the following information:
 - 302 i. Coordination information, including a list of changes to other work that will be necessary to
303 accommodate the substitution
 - 304 ii. A comparison of the substituted products and materials with the specified products and
305 methods, including performance, weight, size, durability, and visual effect.
 - 306 iii. Certification that the substitution conforms to the contract documents and is appropriate
307 for the applications indicated. Material substitution requests must be accompanied by
308 independent laboratory test reports from a lab designated by the Architect to establish
309 equivalent performance levels and specification compliance. The Architect shall designate
310 the testing lab, and the party requesting the substitution shall pay for testing.

311 1.7. PRODUCT DELIVERY, STORAGE AND HANDLING

- 316 a. Deliver and store materials in manufacturer's original unopened containers bearing labels indicating
- 317 the grade, batch, production data, type, and names of products and manufacturers.
- 318 b. During storage and construction, protect rehabilitation materials from wetting by rain, snow or
- 319 ground water, and from staining or intermixture with earth or other types of materials.
- 320 c. Protect stone and other materials from deterioration by moisture and temperature. Store stone in a
- 321 dry location or in waterproof containers. Keep stone on pallets. Do not shrink wrap stone on pallets.
- 322 d. Comply with product manufacturer's recommendations for minimum and maximum temperature
- 323 requirements for storage.
- 324 e. Comply with the manufacturer's written specifications and recommendations for application and
- 325 installation.
- 326 f. Store all materials in a location that will not impede the progress of the work.
- 327

328 1.8. PROJECT CONDITIONS

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- 330 a. Do not perform any masonry work unless air temperatures **within the required scaffold**
- 331 **enclosure** are between 40 degrees Fahrenheit (10 degrees Celsius) and 95 degrees Fahrenheit
- 332 (32 degrees Celsius) and will remain so for at least 120 hours after completion of the work. To
- 333 prevent premature evaporation of the mortar, phase masonry work during hot weather by
- 334 completing the process on the shady side of the wall or by scheduling installation of materials
- 335 during cooler evening hours.
- 336 b. Do not use frozen materials or materials mixed or coated with ice or frost. Do not lower the freezing
- 337 point of mortar by the use of admixtures or anti-freeze agents, and do not use chlorides in the
- 338 mortar.
- 339 c. Prevent mortar from staining the face of the masonry or other surfaces to be left exposed.
- 340 Immediately remove all mortar that comes in contact with any surface.
- 341 d. Cover partially completed work when work is not in progress.
- 342 e. Protect projections from droppings.
- 343 f. Damage occurring to the structure as a result of the Contractor's failure to protect against such
- 344 damage shall be the Contractor's responsibility. The contractor shall restore damaged areas to the
- 345 complete satisfaction of the Architect at no expense to the Owner.
- 346 g. Cold-Weather Requirement for masonry repair and mortar:
- 347 i. Follow ACSI 530 and manufacturers written installation requirements.
- 348 h. Hot-Weather Requirements:
- 349 i. Protect masonry repair and mortar-joint pointing when temperature and humidity
- 350 conditions produce excessive evaporation of water. Provide artificial shade and wind
- 351 breaks and use cooled materials as required. Do not apply mortar to substrates with
- 352 temperatures of 90 degrees Fahrenheit and above.
- 353

354 PART 2: PRODUCTS

355 2.1. MANUFACTURERS

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- 357
- 358 a. In other Part 2 articles where titles below introduce lists, the following requirements apply for
- 359 product selection:
- 360 ii. Products: Subject to compliance with requirements, provide one of the products specified.
- 361 iii. Manufacturers: Subject to compliance with requirements, provide products by the
- 362 manufacturers specified.
- 363

364 2.2. SUBSTITUTE STONE REPAIR COMPOUND

- 365
- 366 a. Substitute Stone Patch (SSP) Material: Must use only mineral-based, single component products
- 367 that contain natural binders; no synthetic polymers or additives are permitted. Substitute stone
- 368 material must be pre-mixed in a quality-controlled factory, with only the addition of water required at
- 369 the site prior to installation.
- 370 b. Acceptable materials:
- 371 i. Jahn M70 Repair Mortar, Cathedral Stone Products, Jessup, Maryland
- 372 ii. Custom System 45, Edison Coatings, Plainville, Connecticut
- 373 c. Substitute Stone Patch Material shall be custom colored to match the existing stone and produced
- 374 in a quality-controlled factory environment. The contractor will be expected to keep a stock of a
- 375 range of six (6) custom colors.
- 376 d. No field mixing of color pigments into the repair materials without preapproval is permitted on-site.
- 377 e. No color staining of existing stone or newly applied repair materials is permitted.
- 378 f. Apply substitute stone materials to areas no more than 2 inches in depth and 3 inches wide or as

379 specifically allowed by the manufacturer.

380
381 2.3. STONE REPLACEMENT MATERIAL

- 382
383 a. All replacement stone shall be Madison Sandstone; no substitutes will be allowed. The Contractor
384 shall use replacement stone that is compatible to the existing stone in appearance, color and
385 texture from the following manufacturers/distributed may be contacted for samples:
386 i. Quarra Stone Company, LLC, Madison, Wisconsin, Contact: Steve Ensor, (608) 246-8803
387 ii. Approved equal
388 b. Mortar for laying replacement stone: Mortar shall be the same as the pointing mortar, as defined in
389 this Section.

390
391 2.4. ALL MORTAR MATERIALS – For Bedding Mortar and Repointing Mortar

- 392
393 a. The basis of the mortar for this project shall be:
394 i. St. Astier Natural Hydraulic Lime NHL 2.0, distributed by TransMineral USA.
395 ii. Pigment – None.
396 iii. Sand – Sand shall be clean and uncontaminated by clay/silt and shall be as follows:
397 1. Clean, sharp, free from loam, silt, vegetable matter, salts, and other injurious
398 substances, conforming to ASTM C144 standard. Such as by Mandt Sandfill,
399 2079 County Hwy MM, Fitchburg, Wisconsin 53575. Match existing in size,
400 shape and color
401 iv. Mortar mix: 1.0 part NHL 2.0, 1.75 parts sand. Wetted with water only to the proper
402 consistency under the direction of the historic masonry consultant.
403 v. Final mortar mix shall be confirmed in the field under the direction of the Architect.
404 b. All mortar shall be prepared and placed in accordance with the Department of the Interior National
405 Park Service Cultural Resources Preservation Briefs 2, "Repointing Mortar Joints in Historic
406 Masonry Buildings" (Revised Edition October 1998), and in compliance with the guidelines set forth
407 by the Secretary of the Interior's Standards.
408 c. The mortar shall match the original in color, grain size and texture. The compressive strength of the
409 repointing mortar shall be equal or less than the compressive strength of the original mortar and
410 surrounding masonry. The replacement mortar shall contain approximately the same ingredient
411 proportions of the original mortar and shall have a water vapor transmission rate greater than all
412 adjacent masonry.
413 d. All replacement mortar ingredients and mortar formulations have been established from test data
414 gathered from the original materials sampled from site, and from performance data observed in the
415 field.
416 e. Mixing of individual mortar ingredients at the construction site will be permitted.
417 f. Repointing mortars may be pre-blended (not including water) in single containers in a factory-
418 controlled environment, however the architect shall have FULL authority to reject any process that
419 in his/her sole discretion will not meet the intent of this specification.
420 g. All ingredients will be converted from volume measurements to weight measurements to ensure
421 quality production of the mortar. This must be accomplished prior to any mix manufacture with the
422 Natural Hydraulic Lime manufacturer.
423 h. All mortar materials delivered to the site shall be tested to confirm specification compliance before
424 mortar is installed in the wall.

425
426 2.5. STONE CONSERVATION TREATMENT (CONSOLIDANT)

- 427
428 i. Consolidant: Conservare H100 Consolidation Treatment by Prosoco
429 a. This product has been tested and has been confirmed to be effective as a conservation
430 treatment for Madison Sandstone
431 b. As part of this project, and immediately after Execution of the Contract for Construction,
432 the Contractor shall at the Architect's direction, extract three (3) 2 inch pieces of stone
433 from the Gates of Heaven for final confirmation of the stone conservation treatment's
434 effectiveness for this specific application
435 c. Testing will be completed as specified herein and the results will be provided to the Owner
436 and Architect

437
438 2.6. OTHER MATERIALS

- 439
440 a. Expansion Anchor: HY 150 Max with stainless steel bolt washer and nut, manufactured by Hilti,
441 Inc., 1132 Miller Park Way, Milwaukee, Wisconsin, 53214, us-sales@hilti.com.

- 442 b. Shims: 2 inch by 4 inch by 1/16 inch, 1/8 inch, and 1/4 inch, plastic shims as manufactured by
443 Racknow Polymers and distributed by Lance Construction Supplies, Inc., Chicago, Illinois, or
444 approved equal.
- 445 c. Strap Anchors: "No. 141 U-Type Stone Anchor," 8 inches long by 1-1/4 inch wide with a 7/8 inch
446 bend (Interior dimension). 16 gauge or 0.625 inch (1/16 inch) thickness, stainless steel conforming
447 to ASTM A 167, AISI Type 304, as manufactured by Heckmann Building Products, Inc., Melrose
448 Park, Illinois.
- 449 d. Dowels (Pins): 3/8 inch diameter by 4 inch long, smooth finish, stainless steel, conforming to ASTM
450 e. 267, AISI Type 304 or 316.
- 451 f. Water: Potable (this means that you should be able to drink it), fresh, clean, clear and free from
452 injurious amounts of sewage, oil, acid, alkali, salts, organic matter or other detrimental substances.
- 453 g. Structural Angle Steel Lintels: hot dipped galvanized ASTM A36 steel – galvanized post
454 modification.
- 455 h. Helical Anchors (As needed only): Such as Spira-Lok helical wall tie system by Blok-Lok. Confirm
456 size and confirm with Architect prior to use.
- 457 i. Masonry Adhesive: Such as Ultimate Modified Polyurethane Hybrid (MPH), color: Buff, by
458 Bonstone Materials Corp.
- 459 j. Crack Injection Material: Depending upon condition in field (characteristics of crack) the following
460 materials may be used:
- 461 i. Dispersed Hydrated Lime Injection Mortar such as DHL-IM by US Heritage Group or
462 approved equal.
- 463 ii. Last Patch Gel by Bonstone Materials Corp.
- 464 iii. Crack Repair 31, Low Viscosity Crack Injection Resin by Bonstone Materials Corp.
- 465 k. Cleaner for Asphalt Tar and Non-Silicone Sealant: Thixotropic stripping compound such as Sure
466 Klean Fast Acting Stripper by Prosoco or approved equal.
- 467 l. Cleaner for Silicone Sealants: Such as Sure Klean Dicone NC9 by Prosoco or approved equal.
- 468 m. Other Items: All other materials not specifically described but required for a complete and proper
469 installation of the Work in this Section, shall be selected by the Contractor subject to approval by
470 the Architect.

471
472 **PART 3: EXECUTION**

473
474 **3.1. EXAMINATION**

- 475
- 476 a. The Contractor shall have the sole responsibility for the accuracy of all measurements and for the
477 estimate of material quantities required and necessary to satisfy the requirements of these
478 Specifications. It is the intent of this project to salvage, preserve and reuse existing stone to the
479 greatest extent possible.
- 480 b. Whenever possible, where full stone replacement is deemed necessary, use approved original
481 material.
- 482 c. Should replacement stone be required due to irreparable damage; match all physical properties
483 including color, texture and size of existing stone.
- 484 d. Verify that installation conditions are satisfactory to receive work of this Section.
- 485 e. Do not proceed until unsatisfactory conditions have been corrected.
- 486 f. Beginning work constitutes the Contractor's acceptance of conditions as satisfactory.
- 487 g. During deconstruction, as well as rehabilitation operations, restore all areas to a weathertight
488 condition each day and/or before inclement weather commences.

489
490 **3.2. SUBSTITUTE STONE PATCH (SSP)**

- 491
- 492 a. Substitute stone repairs require a moldable, plastic filled material applied directly to the loss area
493 and set into place by its own adhesion to the stone substrate. Such stone repair mortars and
494 putties are typically offered by manufacturing companies that do not sell stone.
- 495 b. Substitute stone material may not be installed in thicknesses exceeding 2 inches. Stone repairs in
496 excess of 2 inches thick will require reconfiguring the stone in lieu of performing other repairs.
- 497 c. Remove all loose mortar and masonry prior to installation of the substitute stone material. "Sound"
498 the masonry with a hammer to verify its integrity. If necessary, cut away an additional 1/2" of the
499 stone substrate to ensure the surface to be repaired is solid and stable. Remove any sealant
500 residue.
- 501 d. Cut out all cramp anchors, threaded rod anchors and/or dowels within the damaged masonry area.
502 Any anchors that are free of rust, solidly embedded, and do not project beyond the solid masonry
503 surface may remain. All others should be removed.
- 504 e. Using clean water and a scrub brush, clean all dust from surface and pores of the substrate.

- 505 f. For very dry or porous surfaces, pre-wet the substrate ahead of time to prevent the substrate from
506 drawing moisture out of the repair too quickly. Re-wet the surface immediately before applying the
507 repair material.
- 508 g. Use methods established in project training program to deliver the substitute stone repair work as
509 demonstrated and approved by the Architect and Owner.
- 510 h. Curing methods vary in different parts of the country and at different times of the year, calling for
511 different amounts of water to be used in the first 36 hours after application. Adjustments also have
512 to take into account how much time is remaining before freezing weather occurs.
- 513 i. Follow all manufacturers' instructions pertaining to the placement of materials. If the manufacturer
514 requires that installers of a specified product be trained, provide this documentation to the Architect
515 and supporting documentation. Training certificates previously issued by product companies for the
516 application of specified products may not be substituted for the Project Training "Substitute Stone
517 Certificate" on this project. Applicators previously trained by product companies are encouraged to
518 work on this specific scope, but it is not a mandatory requirement of this specification, only that of
519 the product company to ensure the proper placement of the materials.
- 520 j. Only rehabilitation technicians that hold a Project Training "Substitute Stone Repair Certificate" will
521 be permitted to work on the scope of this stone repair treatment as defined.
522

523 3.3. FERROUS ANCHOR/BOLT REMOVAL

- 524
- 525 a. Remove masonry anchors, brackets, wood nailers, and other extraneous items no longer in use
526 unless identified as historically significant or indicated to remain. Remove landmark plaque without
527 damage to plaque and surrounding stone and provide to Owner for storage.
- 528 b. Remove items carefully to avoid spalling or cracking masonry.
- 529 c. If item cannot be removed without damaging surrounding masonry, cut off item flush with surface
530 and core drill surrounding masonry and item as close around item as practical.
- 531 d. Only rehabilitation technicians that hold a Project Training "Ferrous Anchor/Bolt Removal
532 Certificate" will be permitted to work on the scope of this stone repair treatment as defined.
533

534 3.4. STONE PLUG REPAIR

- 535
- 536 a. At locations where ferrous anchor bolts and the like are removed prepare a replacement plug by
537 core-drilling replacement stone. Use a drill sized to produce a core that will fit into hole drilled in
538 damaged stone with tolerances of no more than +/- 1/16 inch.
- 539 b. Adhere the repair piece with substitute stone patch material and clamp so the seam may cure. Prior
540 to adhering with stone patch compound, the new piece of stone shall be carved and refined to
541 match the surface of the adjacent original stone in both profile and finish. This step is necessary to
542 allow a virtually invisible replacement repair.
- 543 c. Use methods established in project training program to deliver acceptable repair work as
544 demonstrated and approved by the Architect and Owner.
- 545 d. Prior to installing the new piece, the stone shall be carved and refined to match the surface of the
546 adjacent original stone in both profile and finish. This step is necessary to allow a virtually invisible
547 replacement repair. Adhere the repair piece with an appropriate adhesive and clamp so the seam
548 may cure. Provide adhesive options to the CT and Architect for review and approval.
- 549 e. Only rehabilitation technicians that hold a Project Training "Stone Plug Repair Certificate" will be
550 permitted to work on the scope of this stone repair treatment as defined.
551

552 3.5. STONE REMOVAL AND REPLACEMENT

- 553
- 554 a. When directed, remove stone that has deteriorated or is damaged beyond repair. Carefully
555 demolish or remove entire units from joint to joint, without damaging surrounding stone, in a
556 manner that permits replacement with full size units.
- 557 b. Sort stone by size and zone for future use.
- 558 c. Support and protect remaining stonework that surrounds removal area and adjoining construction
559 in an undamaged condition.
- 560 d. Remove in an undamaged condition as many whole stone units as possible.
- 561 e. Remove mortar, loose particles, and soil from stone by cleaning with hand chisels, needle scalers,
562 brushes, and water.
- 563 f. Remove sealants, asphalt and other asphaltic materials by cutting close to stone with utility knife
564 and cleaning with solvents.
- 565 g. Reuse salvaged stone to the fullest extent possible. Integrate new replacement stone in concealed
566 areas or shielded from public view.
- 567 h. Deliver cleaned stone not required for reuse to Owner.

- 568 i. Clean stone surrounding removal areas by removing mortar, dust, and loose particles in
- 569 preparation for replacement.
- 570 j. Only rehabilitation technicians that hold a Project Training "Stone Removal and Replacement
- 571 Certificate" will be permitted to work on the scope of this stone repair treatment as defined.
- 572 k. Replace removed stone with other removed stone, where possible, or with new stone matching
- 573 existing stone, including size. Butter vertical joints for full width before setting and set units in full
- 574 bed of mortar, unless otherwise indicated.
- 575 l. Rake out mortar used for laying stone before mortar sets and point new mortar joints in repaired
- 576 area to comply with requirements for repointing existing stone, and at same time as repointing of
- 577 surrounding area.
- 578 m. Only rehabilitation technicians that hold a Project Training "Stone Removal and Replacement
- 579 Certificate" will be permitted to work on the scope of this stone repair treatment as defined.
- 580

581 3.6. DUTCHMAN (AS REQUIRED ONLY, BY CHANGE ORDER)

- 582
- 583 a. Remove damaged stone to a specified depth and insert a new piece of stone to fit in the opening to
- 584 create the appearance of a seamless patch.
- 585 b. Carefully remove the deteriorated stone material in a larger stone. The Dutchman repair will be
- 586 required on stones with surface face loss which exceeds 2 inches minimum in depth.
- 587 c. At locations indicated, remove regular geometric portions of stone units. Carefully remove stone by
- 588 making vertical and horizontal saw cuts at face of stone and demolishing corner portion of stone
- 589 unit to depth required for fitting partial replacement. Make edges of stone at cuts smooth and
- 590 square to each other and to finished surface.
- 591 d. Remove loose mortar particles and other debris from surfaces to be bonded and surfaces of
- 592 adjacent stone units that will receive mortar by cleaning with stiff-fiber brush.
- 593 e. The new piece must precisely fit into place with tolerances of no more than +/-1/16-inch. Supporting
- 594 rods of stainless steel may be necessary for some Dutchman repairs, depending on the extent of
- 595 the repair and the location.
- 596 f. Prior to installing the new piece, the stone shall be carved and refined to match the surface of the
- 597 adjacent original stone in both profile and finish. This step is necessary to allow a virtually invisible
- 598 replacement repair. Adhere the dutchman with an appropriate adhesive and clamp so the seam
- 599 may cure. Provide adhesive options to the CT and Architect for review and approval.
- 600

601 3.7. POINTING OF MORTAR JOINTS IN STONE

- 602
- 603 a. Center Cut Method: Existing horizontal mortar joints (bed joints) may be raked out using hand tools
- 604 and reciprocating cutters that is narrower than the joint width but not more than 50%. Center cut
- 605 only with mechanical means. Rotary saws and grinders are not permitted.
- 606 b. The vertical mortar joints (head joints) may be treated as horizontal mortar joints for this project due
- 607 to the size of the stone and mortar joints. DO NOT OVERCUT. Overcutting may require the hand
- 608 removal of all vertical mortar joints. This process will be subject to review and rejection by the
- 609 Owner and/or the Architect depending on Contractor performance.
- 610 c. All joints (unless otherwise noted) shall be raked back to sound, solid, back up material. All raking
- 611 out should leave a clean, square face at the back of the joint to provide for maximum contact of
- 612 pointing mortar with the masonry back up mortar.
- 613 d. Shallow or feather edging shall not be permitted.
- 614 e. If, after mortar is raked back voids are encountered in the historic mortar, then prepare the joint to
- 615 provide a proper substrate for pointing mortar installation (tamp pointing).
- 616 f. Existing mortar joints shall be raked out a minimum depth of 4" to 6"
- 617 g. Contractor shall not widen the existing masonry joints.
- 618 h. The surrounding masonry edges shall not be spalled or chipped in the process of mortar removal.
- 619 i. Damage to surrounding stone resulting from rotary blade over running shall not be permitted.
- 620 Contractor shall replace all stone damaged during mortar removal with replacement units that
- 621 match the original exactly. This work shall be done at the Contractor's sole expense.
- 622 j. Remove all friable material. Brush, vacuum, blow out or flush joints with water to remove dirt and
- 623 loose debris, working from top to bottom of wall.
- 624 k. Adjust the mix of the grout to promote optimal flowability, this work shall be conducted under the
- 625 review of the historic masonry consultant and the Architect
- 626 l. Install grout to allow for a full repoint of the joint with new mortar (2.5 x the width of the joint)
- 627 m. Allow for up to 7 days for grout curing, depending on conditions on site
- 628 n. Note: Some wall areas have stone to stone bearing conditions near the finished face of wall
- 629 **For pointing**, exposed surface of stone adjacent to joint shall be thoroughly saturated prior to re-
- 630 pointing. Maintain a water sprayer on site at all times during the re-pointing process.

- 631 o. The mortar material shall resemble the consistency of brown sugar during installation. This drier
632 consistency enables the material to be tightly packed into the joint and allows for cleaner work and
633 helps to prevent shrinkage cracks as the mortar cures.
634 p. Walls should be presoaked with water 10 minutes prior to pointing or as weather conditions dictate.
635 Walls should be misted with water at the end of the day after initial installation.
636 **q. Keep newly pointed wall moist for a minimum of 3-days after installation, including**
637 **weekends and holidays. 3 times per day minimum – morning, noon and night. Actual timing**
638 **should be adjusted due to onsite weather conditions. Confirm all wetting requirements with**
639 **the Architect and NHL mortar manufacturer.**
640 r. Rinse stone joint with water to remove dust and mortar particles. Time the rinsing application so
641 that at the time of pointing excess water has evaporated or run off. Joint surfaces should be damp
642 but free from standing water.
643 s. Mortar may be pre-mixed by approved manufacturer.
644 t. Point all mortar joints to a weather struck/stipple finish profile.
645 u. When mortar is thumbprint hard the joints shall be finished to match the original historic joint profile.
646 **v. Keep mortar from drying out too quickly. Protection from direct sun and high winds for the**
647 **first 72 hours after installation. Follow the NHL manufacturer's requirements and**
648 **recommendations at all times. Be aware that over-wetting is also possible which can lead to**
649 **NHL mortar becoming frost feeble. Consult the manufacturer for all questions regarding the**
650 **nature and handling of NHL based mortar.**
651 w. Install permanent protection from direct sun and high winds. If a scaffold is used, 100% sun screen
652 mesh should be utilized.
653 x. Allow mortar to harden at least 5 days before beginning cleaning work. All cleaning work must be
654 completed no later than the 7th day.
655

656 3.8. STONE CONSERVATION TREATMENT APPLICATION - CONSOLIDATION

657

- 658 a. No work is to commence on any stone without first receiving approval for the final scope from the
659 Architect
660 **b. Final testing of the consolidation on the existing stone must be completed prior to the**
661 **commencement of this work (see above).**
662 c. Install consolidation material as specified in strict accordance with the manufacturer's
663 requirements.
664 d. All exterior stone is to receive this treatment.
665 e. Apply by low-pressure spray using low-pressure tanks as defined by the manufacturer.
666 f. Apply treatment in small areas only, this is a controlled application process
667 g. Apply consolidant in repeated applications referred to as "cycles". A cycle consists of three
668 successive saturating applications at 5-15 minute intervals.
669 h. Allow 20 to 60 minutes between cycles
670 i. Apply until excess material remains visible on the surface for 60 minutes following the last
671 application
672 j. Immediately flush excess surface materials using industrial grade MEK (methyl ethyl ketone).
673

674 3.9. FINISHING TECHNIQUES

675

- 676 a. Acceptable finishing techniques for redressing, substitute stone and crack repair will be defined
677 during the demonstration and test panel work which is part of the training program as approved by
678 the Architect and Owner.
679 b. Do not create vibrations in the wall to dislodge or separate bond from previously completed work.
680

681 3.10. CLEANING

682

- 683 a. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are
684 resistant to cleaning methods being used. Extraneous substances include paint, caulking, sealant,
685 asphalt, and tar.
686 i. Remove paint and caulking with a non-damaging/staining paint remover.
687 ii. Repeat application up to two times if needed.
688 iii. Remove asphalt and tar with solvent-type paint remover.
689 iv. Apply only to asphalt and tar by brush without pre-wetting.
690 v. Allow paint remover to remain on surface for 10 to 30 minutes.
691 vi. Rinse off with water following manufacturer's instructions.
692 vii. Repeat application if needed.
693 viii. Chemical Cleaner Application Methods: **NO CHEMICAL CLEANERS WILL BE**

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- PERMITTED FOR USE ON THIS PROJECT EXCEPT THOSE SPECIFICALLY SPECIFIED AND APPROVED ON SITE BY THE CT AND THE ARCHITECT.** Prior to commencement of any cleaning the contractor shall test the areas as recommended by the manufacturer pending the Architect's review and approval. Final cleaning process must be approved by the Owner and Architect.
- ix. Removing Plant Growth: Completely remove plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing to dry as long as possible before removal. Remove loose soil and debris from open masonry joints to whatever depth they occur.
 - x. Proceed with cleaning in an orderly manner with material selected from mock up testing; work from top to bottom of each scaffold width and from one end of each elevation to the other.
 - xi. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces. Keep area of wall below area of wall being cleaned wet at all times by rinsing with clean water.
 - xii. Use only those cleaning methods approved for each foreign material to be removed.
 - xiii. Do not use wire brushes or brushes that are not resistant to the cleaner being used.
 - xiv. Do not use plastic-bristle brushes unless natural-fiber brushes will not resist cleaner being used.
 - xv. Use spray equipment that provides controlled application at volume and pressure indicated, measured at spray tip. Adjust pressure and volume to ensure that cleaning methods do not damage masonry.
 - xvi. Equip units with pressure gauges.
 - xvii. For water spray application, use fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees. Do not exceed 100 PSI
 - xviii. No high pressure cleaning will be allowed
 - xix. For heated water spray application, use equipment capable of maintaining temperature between 140 and 160 deg F, 185 to 190 deg F in warm weather, at flow rates indicated
- b. Use care when installing mortar, use appropriate methods and workers who are capable of executing work without excessive mess.
 - c. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or fiber brushes, and clean water, spray applied at low pressure.
 - i. Do not use metal scrapers or brushes.
 - ii. Do not use acidic or alkaline cleaners without prior authorization by the CT and Architect.
 - d. Wash adjacent non-masonry surfaces, if applicable. Use detergent and soft brushes or cloths.
 - e. Sweep and rake adjacent pavement and grounds to remove masonry debris. Where necessary, pressure wash surfaces to remove mortar, dust, dirt, and stains.
 - i. .

END OF SECTION 04 01 41