

BIDDING DOCUMENTS

**PROJECT MANUAL
MADISON METRO BUS GARAGE
ROOF REPLACEMENT**

CONTRACT# 8064

**LOCATION OF WORK:
MADISON METRO BUS GARAGE
1101 E WASHINGTON AVE.
MADISON WISCONSIN**

NOVEMBER 6, 2017



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SCOPE OF WORK:

The intent of this project is to replace approximately 165,000 ft² of a ballasted EPDM roofing system with a new one that will increase the overall thermal efficiency and provide a 20 year non-prorated warranty from the roofing manufacturer. The scope of this work will consist of the following:

1. The existing ballasted EPDM membrane roofing system shall be removed down the existing deck. Work shall be done in sections as to minimize rain infiltration exposure to the interior of the building.
2. The existing decking shall be inspected for signs of corrosion, buckling or other structural damage. Any deteriorated or damaged sections shall be replaced on a unit cost basis.
3. Additional wood blocking or nailers shall be installed as shown on the plans and specifications. Any additional wood blocking not foreseen shall be installed on a unit cost basis.
4. Any damaged or deteriorated blocking, nailers or plywood shall be replaced on a unit cost basis. Cost includes removal and installation of new.
5. Any unnecessary blocking, plywood or cants that interferes with the continuous installation of the insulation of the new roofing system shall be removed. This shall be included in the base bid as part of the roof tear off.
6. Staggered layers of 3 1/2" of Polyisocyanurate board insulation will be added over the exposed decking after any repairs are made.
7. All existing roof drains will be replaced as stated on the plans and specifications.
8. Remove gutters, obsolete penetrations, parapet mounted lights, roof hatch and other items as indicated on the demolition plans. The resulting openings in the deck shall be covered with new decking and shall be included in the lump sum bid.
9. The contractor shall be responsible for minor repointing of existing brick masonry walls around roof counter flashing. This work shall be performed on a unit cost basis for actual work performed.
10. The existing overflow scupper on the exterior perimeter wall shall be closed up and patched. These scuppers shall be replaced with overflow drains. Include this patching in the lump sum bid. Two additional scuppers shall be reworked and one will be added as indicated on the plans.
11. The through wall ductwork for one of the roof top units (HV5) shall be reworked in order to provide a warrantable penetration.
12. Exhaust fans with low curbs shall be raised to an elevation that allows for a minimum height of 8" between the top of the curb and the final roof elevation.
13. Exhaust fans EF 6 and EF 14 shall be removed by the owner prior to demo of the area. Reinstallation of these units shall be coordinated with the installation of the new roofing system for this area.
14. Portions of the steel decking were noted to show signs of rusting and buckling from an underside inspection. After removal of the existing

- roofing and insulation, the roof deck shall be inspected and repaired by installing new decking over the damaged area. Work shall be made on a unit cost basis for actual work performed.
15. New concrete pavers shall be added per the plans. The contractor shall be responsible for the removal, modification and repairs to the wooden stairs between roof elevations. Modification may be necessary due to increasing the insulation thickness.
 16. Gutters and roof counter flashing at northeast wall section shall be removed to facilitate the new flashing detail for this wall.
 17. A new 60 mil EPDM ballasted roofing system with detailing as shown on the plans and specifications shall be installed on all sections of the roof. The contractor shall have the option to reuse existing ballast or replace with new.
 18. This summary is not intended to provide a complete listing of all work that is required and does not limit the scope of work of the project. The contractor shall be responsible for providing a finished roofing system with all necessary detailing to complete the project as intended in the plans and specifications.

Work to be contracted outside of the contract

Remove and re-hang of 5 light fixtures above bus entrance overhead doors. Installation of new lights to be done on another contract prior to roof work starting. Units will be left de-energized on the parapet wall. The contractor shall remove and patch.

Work to be done by owner

The owner's intent is to assist the contractor with a limited amount of specialized work that facilitates a successful installation with timely support. This work includes:

1. Remove existing heat recover piping penetrations and other obsolete penetrations.
2. Disconnect and reconnect refrigeration lines, gas lines for various RTUs as required.
3. Coordinate shut down of unit, shut off power to RTUs, disconnect electrical as necessary, reconnect, energize unit and check operation.
4. Prime and paint surface rust on the reglets that are designated to remain on the brick masonry walls roof flashing.
5. Replace exhaust fans EF 6 and EF 14. The contractor shall coordinate roofing work with the removal and installation of these fans.
6. Remediation of any asbestos materials. HV 15 was found to have sealant containing asbestos. This shall be removed by the City during the project.

**SECTION 00 31 46
PERMITS**

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11 **PART 1 – GENERAL**

12
13 **1.1. SUMMARY**

- 14 A. Each project has varying requirements for permits, inspections, and fees based on the scope, size, and location of
15 the project.
16 B. The City of Madison (Owner) is subject to all permits, inspections and associated fees for construction,
17 demolition, utility connection, storm water management, and other similar requirements that may be required
18 to complete the scope of work associated with these contract documents.
19 C. The General Contractor (GC) shall be responsible for obtaining all permits, inspections and paying for all
20 associated fees unless specifically identified within this specification.
21

22 **1.2. REFERENCES**

- 23 A. The following references are not intended to be all inclusive. It shall be the GC’s responsibility to determine all
24 requirements based on the scope of work in the contract documents.
25 B. City of Madison Ordinances: Review all ordinances that may require a permit or fee that may be connected with
26 a required permit. Contact the following City Agencies to determine the exact requirements during bidding
27 1. Building Inspection
28 2. Zoning
29 3. Engineering
30 4. Water Utility
31 5. Traffic Engineering
32 6. Others as may be specified by the contract documents.
33 B. State Statutes
34 C. Other Regulatory Regulations
35 D. Other Agencies or companies that may have related requirements
36 1. Madison Metropolitan Sewerage District
37 2. Local gas and electric utility companies
38 3. Other utility companies
39

40 **1.3. GENERAL CONTRACTORS REQUIREMENTS**

- 41 A. The GC shall be responsible for all of the following:
42 1. Execute application for all required permits as may be required by the scope of work described within the
43 contract documents.
44 2. Paying all fees associated with the application of any required permits.
45 3. Scheduling all required inspections that may be conditions of any required permits.
46 B. The GC shall provide high quality scanned images of all required permits and inspections to the City Project
47 Manager (CPM).
48

49 **PART 2 – PRODUCTS – THIS SECTION NOT USED**

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51 **PART 3 – EXECUTION – THIS SECTION NOT USED**

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54
55 **END OF SECTION**
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SECTION 01 25 13
PRODUCT SUBSTITUTION PROCEDURES

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PART 1 – GENERAL

1.1. SUMMARY

- 17 A. The City of Madison uses a specific list of preferred products for various specification items to establish
18 standards of quality, utility, and appearance required.
19 B. The City of Madison will not allow substitutions for specified Products except as follows:
20 1. The Product is no longer produced or the product manufacturer is no longer in business.
21 2. The manufacturer has significantly changed performance data, product dimensions, or other such design
22 criteria for the specified Product(s).
23 3. Products specified by naming one or more Products or manufacturer’s and “or approved equal” or
24 “approved equivalent.”
25 C. The City of Madison will not allow substitutions for specified Products as follows:
26 1. For Products specified by naming only one Product and manufacturer, no substitute product will be
27 considered.
28 2. For Products specified by naming several Products or manufacturers select any one of the products or
29 manufacturers named, which complies with the specifications. No substitute product will be considered.
30 D. Request for substitutions from any party other than the General Contractor (GC) will not be accepted.
31

1.2. RELATED SPECIFICATIONS

- 32 A. Section 01 33 23 Submittals
34

PART 2 – PRODUCTS

2.1. SUBSTITUTION REQUEST FORM

- 37 A. During bidding all contractors (General and Sub-contractors) and suppliers of materials or products shall provide
38 hard copy of the Substitution Request form and all required attachments directly to the Project Engineer.
39 B. After bidding only the GC shall submit a request and shall use the form provided by CPM.
40
41

PART 3 - EXECUTION

3.1. REQUESTING A SUBSTITUTION DURING BIDDING

- 42 A. In the event that a substitution is requested during the bidding phase the Contractor or Supplier shall meet the
43 substitution request deadline listed in the bidding documents. No substitution request will be considered during
44 the bidding period after the stated substitution request deadline. In general this procedure shall be as follows:
45 1. Submit the Substitution Request Form including all required supporting documentation to the City
46 Project Manager and Project Engineer by the substitution request deadline specified in Section A of the
47 Contract Documents.
48 2. Submit a Substitution Request Form for each product, supported with complete data, drawings and
49 samples as appropriate, including:
50 i. Comparison of qualities of the proposed substitutions with that specified.
51 ii. Changes required in other elements of the Work because of the substitution.
52 iii. Effect on the construction schedule.
53 iv. Cost data comparing the proposed substitution with the Product specified.
54 v. Any required license fees or royalties.
55
56
57

- 1 vi. Availability of maintenance service and source of replacement materials.
2 3. The Owner and Engineer will review the Substitution Request Form and if approved the City of Madison
3 will publish a bidding addendum authorizing the replacement. The Owner and Engineer may reject any
4 substitution request without providing specific reasons.
5 B. Substitutions submitted and approved during the bidding phase shall be announced by the City of Madison by
6 addenda prior to the bid due date.
7

8 **3.2. REQUESTING A SUBSTITUTION AFTER AWARD OF CONTRACT**

- 9 A. A substitution request will only be considered after award of contract if it meets the qualifying provisions as
10 described in 1.1.B.1 above.
11 B. The GC shall submit a substitution request using the form provided by CPM.
12 1. Consulting Staff, Owner and Owners Representatives will review the request and provide the appropriate
13 approvals and feed back to the GC.
14

15 **3.3. UNAUTHORIZED SUBSTITUTIONS**

- 16 A. Any Contractor who substitutes products without proper authorization by the Owner and Engineer will be
17 required to immediately remove and replace the product and all costs required to conform to the Contract
18 Documents shall be borne by the General Prime Contractor.
19
20
21

22 **END OF SECTION**
23

SECTION 01 26 57
CHANGE ORDER REQUESTS (COR)

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19 **PART 1 – GENERAL**

20
21 **1.1. SUMMARY**

- 22 A. Except in cases of emergency no changes in the Work required by the Contract Documents may be made by
23 the General Contractor (GC) without having prior approval of the City Engineer or his representative.
24 B. The City may at any time, without invalidating the Contract and without Notice to Sureties, order changes in
25 the Work by written Change Order (CO). Such changes may include additions and/or deletions.
26 C. Where the City desires to make changes in the Work through use of written Change Order Request (COR), the
27 following procedures apply:
28 1. If requested by the City, the GC shall prepare and submit a detailed proposal, including all cost and time
29 adjustments to which the GC believes it will be entitled if the change proposed is incorporated into the
30 Contract. The City shall be under no legal obligation to issue a Change Order for such proposal.
31 2. The parties shall attempt in good faith to reach agreement on the adjustments needed to the Contract to
32 properly incorporate the proposed change(s) into the Work. In the event that the parties agree on such
33 adjustments, the City may issue a Change Order and incorporate such changes and agreed to
34 adjustments, if any.
35 3. In some instances, it may be necessary for the City to authorize Work or direct changes in Work for which
36 no final and binding agreement has been reached and for which unit prices are not applicable. In such
37 cases the following shall apply.
38 a. Upon written request by the City, the GC shall perform proposed Work
39 b. The cost of such change may be determined in accordance with this specification.
40 c. In the event agreement cannot be accomplished as contemplated herein, the City may authorize
41 the Work to be performed by City forces or to hire others to complete the Work. Such action on
42 the part of the City shall not be the basis of a claim by the GC for failure to allow it to perform the
43 changed Work.
44 D. Where changes in the Work are made by the City through use of a force account basis, the GC shall as soon as
45 practicable, and in no case later than ten (10) working days from the receipt of such order, unless another time
46 period has been agreed to by both parties, give the City written Notice, stating:
47 1. The date, circumstances and source of the extra work; and,
48 2. The cost of performing extra work described by such Order, if any; and,
49 3. Effect of the order on the required completion date of the Project, if any.
50 E. The giving of each Notice by the GC as prescribed by this specification, shall be a requirement to liability of the
51 City for payment of any additional costs incurred by the GC in implementing changes in the Work. Under this
52 specification, no order or statement of the City shall be treated as a Change Order, or shall entitle the GC to an
53 equitable adjustment of the terms of this Contract or damages for costs incurred by the GC on any activity for
54 which the Notice was not given.
55 F. In the event Work is required due to an emergency as described in this specification the GC must request an
56 equitable adjustment as soon as practicable, and in no case later than ten (10) working days of the
57 commencement of such emergency.

- 1 G. All GC requests for equitable adjustment shall be submitted to the CPM per the specifications below. Such
2 requests shall set forth with specificity the amount of and reason(s) for the proposed adjustment and shall be
3 accompanied by supporting information and documents.
4 H. No adjustment of any kind shall be made to this Contract, if asserted by the GC for the first time, after the date
5 of final payment.
6 I. This specification shall be used by the GC when preparing documentation for any COR to ensure each has been
7 properly and completely filled out as required by the City of Madison.
8

9 **1.2. RELATED SPECIFICATION SECTIONS**

- 10 A. Section 01 26 63 Change Order (CO)
11 B. Parts of this specification will reference articles within "The City of Madison Standard Specifications for Public
12 Works Construction".
13 1. Use the following link to access the Standard Specifications web page:
14 <http://www.cityofmadison.com/business/pw/specs.cfm>
15 a. Click on the "Part" chapter identified in the specification text. For example if the specification
16 says "Refer to City of Madison Standard Specification 210.2" click the link for Part II, the Part II
17 PDF will open.
18 b. Scroll through the index of Part II for specification 210.2 and click the text link which will take you
19 to the referenced text.
20

21 **1.3. DEFINITIONS AND STANDARDS**

- 22 A. LABOR: The amount of time and cost associated with the performance of human effort for a defined scope of
23 Work. Labor is further defined as follows:
24 1. Labor rate is the total hourly rate which includes the base rate of pay, fringe benefits plus each
25 company's cost of required insurance, also referred to as a reimbursable labor rate.
26 2. Unit labor is the labor hours anticipated to install the corresponding unit of material.
27 3. Labor cost is the labor hours multiplied by the hourly labor rates.
28 B. MATERIAL: Actual material cost is the amount paid, or to be paid, by the GC for materials, supplies and
29 equipment entering permanently into the Work, including cost of transportation and applicable taxes. The cost
30 shall not exceed the usual and customary cost for such items available in the geographical area of the project.
31 C. LARGE TOOLS AND MAJOR EQUIPMENT: Large tools and major equipment are those with an initial cost greater
32 than \$1,500, whether from the GC or other sources.
33 1. Tool and equipment use and time allowed is only for extra work associated with change orders.
34 a. Rental Rate is the machine cost associated with operating a piece of equipment for a defined
35 length of time (hour, day, week, or month) and shall not exceed the usual and customary amount
36 for such items available in the geographical area of the project.
37 b. Rental cost is the rental rate multiplied by the anticipated duration the equipment shall be
38 required.
39 2. The GC shall provide a breakdown of all rental rates to indicate what items and costs are associated with
40 the rate. Examples of items to include in the breakdown would be fuel consumption, lubrication,
41 maintenance and other similar expenses but not including profit and overhead.
42 3. When large tools and equipment needed for Change Order work are not already at the job site, the
43 actual cost to get the item there is also reimbursable.
44 D. BOND COST: The cost shall be calculated at 1% of the total proposed change order.
45 E. SUB-CONTRACTOR COSTS: Sub-contractor costs are for those labor, material, and equipment costs required by
46 subcontracted specialties to complete the Change Order work including allowable markups as outlined within
47 this specification.
48 F. OVERHEAD AND PROFIT Markup: The allowable markup percentage to a COR by the GC and Sub-contractors for
49 overhead and profit. All of the following are expenses associated with overhead and profit and shall not be
50 reimbursable as individual items on any COR:
51 1. CHANGE ORDER PREPARATION: All costs associated with the preparing and processing of the change
52 order.
53 2. DESIGN, ESTIMATING, AND SUPERVISION: All such efforts, unless specifically requested by Owner as
54 additional Work to be documented as a COR or portion thereof.
55 3. INSTALLATION LAYOUT: The layout required for the installation of material and equipment, and the
56 installation design, is the responsibility of the GC.

- 1 4. SMALL TOOLS AND SUPPLIES: The cost of small hand tools with an initial cost of \$1,500 or less, along
2 with consumable supplies and expendable items such as drill bits, saw blades, gasoline, lubricating or
3 cutting oil, and similar items.
4 5. GENERAL EXPENSE: The general expense, which is those items that are a specific job cost not associated
5 with direct labor and material such as job trailers, foreman truck, and similar items.
6 6. RECORD DRAWINGS: The preparation of record or as-built drawings.
7 7. OTHER COSTS: Any miscellaneous cost not directly assessable to the execution of the Change Order
8 including but not limited to the following:
9 a. All association dues, assessments, and similar items.
10 b. All education, training, and similar items.
11 c. All drafting and/or engineering, unless specifically requested by Owner as additional Work to be
12 documented as a Change Order proposal or portion thereof.
13 d. All other items including but not limited to review, coordination, estimating and expediting, field
14 and office supervision, administrative work, etc.
15 G. Contract Extension: The necessary amount of time to be added to the contract deadlines for the completion of a
16 change order.
17

18 **1.4. CONTRACT EXTENSION**

- 19 A. The GC shall not assume that every COR will require a Contract Extension. If the GC feels a contract extension is
20 warranted he/she shall provide sufficient scheduling information that shows how the COR being requested
21 impacts the critical path of the project.
22 B. The City of Madison strongly encourages the GC to explore alternative methods and practices prior to submitting
23 a COR with a request for contract extension.
24

25 **1.5. OVERHEAD AND PROFIT MARKUP**

- 26 A. Pursuant to the City of Madison Standard Specifications for Public Works Construction, Section 104.7, Extra
27 Work, the following maximum allowable markups shall be strictly enforced on all change orders associated with
28 the execution of this contract.
29 1. The total maximum overhead and profit shall not exceed fifteen percent (15%) of the total costs.
30 2. The total maximum overhead and profit shall be distributed as follows:
31 a. For work performed and materials provided solely by the General Contractor, fifteen percent
32 (15%) of the total costs.
33 b. For work performed and materials provided solely by Sub-contractors and supervised by the
34 General Contractor:
35 i. Supervision of the GC, five percent (5%) of the total Sub-contractor cost.
36 ii. Sub-contractors work and materials ten percent (10%) of the total Sub-contractor cost.
37

38 **1.6. PERFORMANCE REQUIREMENTS**

- 39 A. The GC shall become thoroughly familiar with this specification as it will identify procedures and expenses that
40 are or are not allowed under the Change Order and Change Order Request process.
41 B. The GC shall be responsible for all of the following:
42 1. Carefully reviewing the CB that is associated with the COR.
43 2. Collecting required supporting documentation from all contractors that quantify the need for a COR.
44 a. Labor hours and wage rates
45 b. Material costs
46 c. Equipment costs
47 C. The following shall apply to establishing prices for labor, materials, and equipment costs:
48 1. Where Work to be completed has previously been established by individual bid items in the contract bid
49 proposal the GC shall use the unit bid prices previously established.
50 2. Where Work to be completed was bid as a Lump Sum without individual bid items the GC shall provide a
51 breakdown of all labor, materials, equipment including unit rates and quantities required.
52 D. The completion date is determined by Owner. The schedule, however, is the responsibility of the GC. Time
53 extensions for extra Work will be considered when a schedule analysis of the critical path shows that the Change
54 Order Request places the Work beyond the completion date stated in the Contract.

1
2 **1.7. QUALITY ASSURANCE**

- 3 A. The GC shall be responsible for ensuring that all COR supporting documentation meets the following
4 requirements prior to completing the COR form:
5 1. Sufficiently indicates labor, material, and other expenses related to completing the intent of the CB.
6 2. No costs exceed the usual and customary amount for such items available in the geographical area of the
7 project, and no costs exceed those established under the contract.
8 B. The Project Engineer (PE), City Project Manager (CPM), other members of the consulting staff, and city staff shall
9 review all COR requests to ensure that the intent of the CB will be met under the proposal of the COR or request
10 additional information as necessary.
11

12 **PART 2 – PRODUCTS**

13
14 **2.1. CHANGE ORDER REQUEST FORM**

- 15 A. Will be provided by CPM.
16

17 **PART 3 - EXECUTION**

18
19 **3.1. ESTABLISHING A CHANGE ORDER REQUEST**

- 20 A. Upon receipt of a Construction Bulletin (CB) where the GC believes a significant change in contract scope
21 warrants the submittal of a COR the GC shall do all of the following within ten (10) working days after receipt of
22 the CB:
23 1. Review the CB with all necessary trades and sub-contractors required by the change in scope.
24 a. Additions or deletions to the contract scope shall be as directed within the CB.
25 b. Additions or deletions of labor and materials shall be determined by the GC based on the
26 directives of the CB.
27 2. Assemble all required back-up documentation for additions and deletions including material breakdown,
28 labor breakdown and other related contract costs as previously outlined in this specification.
29 3. Submit a COR request form.
30 B. Submitting a COR does not obligate the GC to complete the work associated with the COR nor does it obligate
31 the Owner to approve the COR as a change to the contract.
32

33 **3.2. CHANGE ORDER REQUEST REVIEW, APPROVAL, AND PROCESSING**

- 34 A. The PE and CPM shall review all CORs submitted by the GC.
35 1. Additional consulting staff and city staff having knowledge of the components of the COR shall review
36 and advise the PE and CPM as to the accuracy of the items, quantities, and associated costs of the COR as
37 directed by the CB.
38 2. The CPM shall review the COR with the Owner.
39 B. If required the PE and CPM, shall in good faith, further negotiate the COR with the GC as necessary. All
40 amendments to any COR shall be documented.
41 C. After final review of the COR the CPM and Owner may accept the COR.
42 D. The CPM shall prepare the COR in the form of an official Board of Public Works Change Order for final review and
43 approval as outlined in Section 01 26 63 Change Order (CO).
44 E. The GC shall not act upon any accepted COR until it has received final approval through the Public Works process
45 as an official CO to the Work unless instructed to do so by the CPM. Proceeding without the final approval of a
46 fully authorized Change Order is at the GC's own risk.
47

48 **3.3. EMERGENCY CHANGE ORDER REQUEST**

- 49 A. In the event Work is required due to an emergency as described in the Contract Documents, the GC must
50 request an equitable adjustment as soon as practicable, and in no case later than ten (10) working days of the
51 commencement of such emergency.
52 B. The GC shall provide full documentation of all labor, materials and equipment used during the period of
53 emergency as part of the COR submittal.
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END OF SECTION

**SECTION 01 26 63
CHANGE ORDER (CO)**

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PART 1 – GENERAL

1.1. SUMMARY

- 17 A. Except in cases of emergency, no changes in the Work required by the Contract Documents may be made
18 by the General Contractor (GC) without having prior approval of the City Project Manager (CPM).
19 B. The City may at any time, without invalidating the Contract and without Notice to Sureties, order changes in
20 the Work by written Change Order. Such changes may include additions and/or deletions.
21 C. The Change Order (CO) is a Board of Public Works (BPW) form that is reviewed and approved by a specific
22 process.
23 D. The CO form is typically made up of multiple Change Order Requests (CORs) and/or Bid Items as appropriate
24 depending on the type of project and how the contract was bid.
25

1.2. RELATED SPECIFICATION SECTIONS

- 26 A. Section 01 26 63 Change Order Request (COR)
27
28

1.3. BOARD OF PUBLIC WORKS PROCEDURE

- 29 A. The Board of Public Works has a very explicit procedure for the review and approval of all change orders
30 associated with any Public Works Contract as follows:
31 1. The Supervisory Chain of the CPM shall review and approve any CO under \$10,000 provided it does not
32 include either of the following:
33 a. The CO does not request a time extension to the contract.
34 b. The CO does not cause the contract contingency sum to be exceeded.
35 2. The Board of Public Works shall review and approve any CO that requires any of the following:
36 a. Any CO over \$20,000.
37 b. Any CO requesting a time extension to the contract regardless of the monetary value of the CO.
38 c. Any CO that that causes the contract contingency sum to be exceeded.
39 B. The Board of Public Works generally meets every other week and only once in August and December. The GC is
40 cautioned that, under normal scheduling, a CO requiring a BPW review will take a minimum of two (2) weeks to
41 achieve final approval.
42 1. The City shall not be responsible for additional delays to the Work caused by the scheduling constraints
43 of the Board of Public Works.
44 C. SPECIAL NOTE: The GC is cautioned to never proceed unless told to do so by the CPM. Only in rare instances
45 may the CPM give a written notice to proceed on a COR without an approved CO. Proceeding without the
46 written notice of the CPM or an approved CO is at the GC’s own risk.
47
48

PART 2 – PRODUCTS

2.1. CHANGE ORDER FORM

- 50 A. Provided by CPM.
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PART 3 - EXECUTION

3.1. PREPARATION OF THE CHANGE ORDER

- 54 A. The CPM shall prepare the required CO as follows:
55
56
57

- 1 1. Provide information for all contract information.
- 2 2. Provide a general description of the items described within the change order.
- 3 3. Provide detailed information for each Item on the CO form. At the option of the CPM he/she may include
- 4 multiple Change Order Requests each as their own item.
- 5 4. Provide required pricing breakdown and accounting information as needed for the item.
- 6 5. Insert attachments of contractor/architect provided information that clarifies and quantifies the CO.
- 7 Attachments may include but not be limited to material lists, estimated labor breakdown, revised details
- 8 or specifications, and other documents that may be related to the requested change.
- 9 6. Save the final version of the completed CO.

10
11 **3.2. EXECUTION OF THE CHANGE ORDER**

- 12 A. The GC shall do the following:
 - 13 1. Review all items on the CO form.
 - 14 2. The GC shall notify the CPM immediately of any errors or discrepancies on the form and shall not sign or
 - 15 save it.
 - 16 a. The CPM shall make any corrections as needed, re-save the form, and notify the GC.
 - 17 3. If/when the GC concurs with the CO form as drafted the GC shall digitally sign the form.
- 18 B. The CPM shall do the following:
 - 19 1. Monitor the review process
 - 20 2. Ensure that proper BPW procedures are executed as needed by the CO approval process.
 - 21 a. Schedule the CO on the next available BPW agenda if required.
 - 22 i. Attend the BPW meeting to speak on the CO to board members and answer questions.
 - 23 ii. The GC and/or PE may be required to attend the BPW meeting to address specific
 - 24 information as it relates to the Work and/or materials associated with the CO.
 - 25 3. Monitor final approval and distribution of the CO.
 - 26 4. Notify the GC that the CO has been completed.
 - 27 5. Ensure that the CO is posted to the next Public Works payment schedule.
 - 28 6. Verify that the GC's next Progress Payment-Schedule of Values show the CO as part of the contract sum.
- 29 C. Upon final approval of the CO the GC may proceed with executing the Work associated with the CO.

30
31
32
33 **END OF SECTION**
34

SECTION 01 33 23
SUBMITTALS

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7 1.3. SUBMITTAL REQUIREMENTS 1
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11 3.2. SUBMITTAL REVIEW 2
12 3.3. PROJECT ENGINEERS REVIEW 2
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PART 1 – GENERAL

1.1. SUMMARY

- 17 A. The General Contractor (GC) shall be responsible for providing submittals for review of all contractors and sub-
18 contractors as designated in the construction documents. Submittals shall include but not be limited to all of the
19 following:
20 1. Equipment specified and pre-approved in the specification; to ensure quality, construction, and
21 performance specifications have not changed since final design.
22 2. Equipment specified by performance in the specification; to ensure that the intended quality,
23 construction, and performance specified is met by the selected material or product.
24 3. Shop, piece, erection, and other such drawings as indicated in the specifications to ensure all structural,
25 dimensional, and assembly requirements are being met.
26 4. Submittals indicating installation sequencing
27 5. Submittals indicating control sequencing
28 6. Contractor licensing, certification, and other such regulatory documentation when required by a
29 specification.
30 7. Other submittals as may be required by individual specifications.
31 B. The submittal process shall not be used to determine alternates to specified products or equipment. All
32 considerations shall be reviewed during the bidding process and acceptable alternates shall be acknowledged by
33 addendum prior to the closing of bidding. See bidding instructions for the information on submitting alternates
34 for consideration.
35 D. In the event that a manufacturer has significantly changed a product (discontinued a model, changed dimension
36 or performance data changed available colors, etc.) since bid opening the GC shall Notify the City Project
37 Manager requesting other approved alternates prior to uploading a digital submittal.
38 E. Contractors and sub-contractors shall be responsible for knowing the submittal requirements of ALL sections
39 within their scope of work under the contract. The Owner reserves the right to request documentation on any
40 materials, equipment, or product being installed where a submittal is not on file. If the material, equipment, or
41 product installed is determined not to meet the intent of the specification the contractor/sub-contractor shall be
42 required to remove and replace the items involved. The GC shall be solely responsible for all costs associated
43 with the removal and replacement.
44

1.2. RELATED REFERENCES

- 46 A. All Technical Specifications, contract documents, construction drawings, and any published addendums during
47 the bidding process.
48 B. All contract documents generated during the execution of the contract.
49

1.3. SUBMITTAL REQUIREMENTS

- 51 A. A completed submittal shall meet the following requirements:
52 1. Digital submittal shall be original PDF of manufacturer’s data sheets or high quality color scan of the
53 same.
54 a. Submittals shall not include sales fliers or other similar documents that typically do not provide
55 complete manufacturers data.
56 2. Documents within the PDF submittal shall be printable to a sized sheet no less than 8-1/2 by 11 inches
57 and no larger than 24 by 36 inches.

- 1 3. At the beginning of each submittal the contractor shall identify the plan reference (WC-1, EF-3, etc.) in
- 2 RED block letters that the submittal is for.
- 3 4. Where multiple model numbers appear in a table the contractor shall identify the specific model being
- 4 submitted by using a RED square, box, or other designation to distinguish the correct model from others
- 5 on the page.
- 6 B. A complete submittal will include all information associated with the product or equipment as presented in
- 7 plans, equipment tables, and specifications. Information shall include but not be limited to the following:
- 8 1. Dimensional data
- 9 2. Performance data
- 10 3. Resource requirements, power, water, waste, etc.
- 11 4. Clearance and maintenance requirements
- 12 5. Finish information, colors, textures, etc.
- 13 6. Warranty information
- 14 C. Where a submittal includes material samples (carpet, tile, paint draw downs, etc.) the contractor shall do the
- 15 following:
- 16 1. The Contractor shall submit the sample(s) as indicated in the specification.
- 17 2. The Contractor shall include a quality photograph(s) of the product with the digital submittal.
- 18 Photographs shall meet the following requirements:
- 19 a. Formatted to be between 500Kb and 1.0 Mb in file size
- 20 b. Have no glare or flash reflection on the sample
- 21 c. Sample fills the frame of the photo and shows detail as needed. Include multiple photos from
- 22 other angles as needed.
- 23 d. Scanned copies of products or photos are not acceptable.
- 24 D. Uploaded submittals should be relative and related to a specific written specification.
- 25 1. Do not upload submittals under a broad category or division (I.E. HVAC 23 00 00). Always upload by the
- 26 specific specification that identifies a required product or performance to be met.
- 27 2. Group related items together if the specification is written that way. (I.E. all of the plumbing fixtures and
- 28 trim relative to one specific specification should be submitted together).
- 29 3. Submittals shall be grouped and adhere to the divisions in the submittal schedule. Submittals that do not
- 30 conform to the submittal schedule and/or specification divisions will be rejected for re-submittal.

31
32 **PART 2 – PRODUCTS – THIS SECTION NOT USED**

33
34 **PART 3 - EXECUTION**

35
36 **3.1. GENERAL CONTRACTORS PROCEDURES**

- 37 A. All required submittals will be submitted electronically by the GC.
- 38 B. Uploading the submittal indicates that the GC has reviewed and approved the submittal against the contract
- 39 document requirements.
- 40 C. The GC shall discuss submittal status at all progress meetings and shall monitor submittal review/approval/re-
- 41 submittal so as to not incur delays in the project schedule.
- 42 D. The GC and sub-contractors shall provide re-submittals as required.

43
44 **3.2. SUBMITTAL REVIEW**

- 45 A. The submittal shall be reviewed internally by the required Architect/Engineer and Owner Representative in a
- 46 timely fashion and provide commentary on missing items, incorrect information, or incomplete shop drawings,
- 47 etc. as needed.
- 48 B. When the internal review is completed the CPM will notify the Project Engineer the submittal is ready for final
- 49 review.
- 50 C. Information will be transmitted electronically.

51
52 **3.3. PROJECT ENGINEERS REVIEW**

- 53 A. Upon completion of the internal review the Project Engineer shall review all internal review comments, confer
- 54 with the CPM as needed and determine the appropriate disposition status for the submittal (approved or
- 55 resubmit).

- 1 B. The Project Engineer shall summarize final internal review comments onto the submittal cover sheet, provide a
- 2 final disposition of the submittal and update the review status of the submittal to "Complete..." (With or w/o
- 3 comments) or "Rejected".
- 4 C. A completed Final Review status initiates the CPM to notify the GC and appropriate sub-contractor(s) that the
- 5 review of the submittal has been completed.
- 6 D. Information will be transmitted electronically.

END OF SECTION

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8
9

**SECTION 01 73 29
CUTTING AND PATCHING**

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14 3.2. PREPARATION 2
15 3.3. PERFORMANCE 2
16 3.4. CLEANUP AND RESTORATION 3
17

PART 1 – GENERAL

1.1. SUMMARY

- 21 A. This Section includes general procedural requirements for cutting and patching including, but not limited to the
22 following:
23 1. Typical areas of cutting and patching for this project may include cutting and patching of metal deck and
24 wall for enlarging scuppers.
25 2. Examination
26 2. Preparation
27 3. Performance
28 4. Cleanup and Restoration
29
30

1.2. RELATED SPECIFICATION SECTIONS-THIS SECTION NOT USED

1.3. DEFINITIONS

- 34 A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
35 B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other
36 Work.
37

1.4. QUALITY ASSURANCE

- 39 A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying
40 capacity or load-deflection ratio.
41 B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results
42 in reducing their capacity to perform as intended or that may result in increased maintenance or decreased
43 operational life or safety.
44 C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that
45 could change their load-carrying capacity that results in reducing their capacity to perform as intended, or that
46 may result in increased maintenance or decreased operational life or safety. Some miscellaneous elements
47 include the following:
48 1. Water, moisture, or vapor barriers
49 2. Membranes and flashings
50 3. Exterior curtain-wall construction
51 4. Equipment supports
52 5. Piping, ductwork, vessels, and equipment
53 6. Noise and vibration control elements and systems
54 D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and
55 patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that
56 would, in Engineer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has
57 been cut and patched in a visually unsatisfactory manner.

1 **1.5. WARRANTY**

- 2 A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting
3 and patching operations, by methods and with materials so as not to void existing warranties.
4 B. All cutting and patching work performed under this contract shall be warranted like new work as defined by the
5 Specification governing the work.
6

7 **PART 2 - MATERIALS**

8
9 **2.1. GENERAL**

- 10 A. Comply with requirements specified within other sections of the Specifications.
11 B. In-Place Materials: Use materials identical to existing in-place materials. For exposed surfaces use materials that
12 visually match in-place adjacent surfaces to the fullest extent possible.
13 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the
14 visual and functional performance of in-place materials.
15

16 **PART 3 - EXECUTION**

17
18 **3.1. EXAMINATION**

- 19 A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
20 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including
21 compatibility with in-place finishes or primers.
22 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.
23

24 **3.2. PREPARATION**

- 25 A. Temporary Support: Provide temporary support of Work to be cut.
26 B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection
27 from adverse weather conditions for portions of Project that might be exposed during cutting and patching
28 operations. If the failure to protect, or the lack of protection, of in-place construction and/or existing conditions
29 results in damage, the contractor shall be responsible for repair to previous condition.
30 C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
31 D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be
32 removed, relocated, or abandoned, bypass such services/systems before cutting to eliminate interruption to
33 occupied areas.
34

35 **3.3. PERFORMANCE**

- 36 A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the
37 earliest feasible time, and complete without delay.
38 1. Cut in-place construction to provide for installation of other components or performance of other
39 construction, and subsequently patch as required to restore surfaces to their original condition.
40 B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations,
41 including excavation, using methods least likely to damage elements retained or adjoining construction. If
42 possible, review proposed procedures with original Installer; comply with original Installer's written
43 recommendations.
44 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and
45 chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance
46 of adjacent surfaces. Temporarily cover openings when not in use.
47 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
48 3. Concrete or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
49 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by
50 cutting and patching operations.
51 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap,
52 valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other
53 foreign matter after cutting.
54 6. Proceed with patching after construction operations requiring cutting are complete.
55 C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following
56 performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and
57 comply with installation requirements specified in other Sections.

- 1 D. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of
2 installation.
3

4 **3.4. CLEANUP AND RESTORATION**

- 5 A. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a
6 manner that will eliminate evidence of patching and refinishing.
7 1. Clean piping, conduit, and similar features before applying paint or other finishing materials.
8 2. Restore damaged pipe covering to its original condition.
9 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another,
10 patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish,
11 color, texture, and appearance. Remove in-place floor and wall coverings and replace with new
12 materials, if necessary, to achieve uniform color and appearance.
13 4. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch
14 and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats
15 until patch blends with adjacent surfaces.
16 5. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of
17 uniform appearance.
18 6. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight
19 condition.
20 7. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint,
21 mortar, oils, putty, and similar materials.
22 8. Any smoke and fire caulking that has been disturbed must be replaced by the Contractor as required by
23 Code.
24

25 **END OF SECTION**
26
27

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

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7 1.3. CITY ORDINANCES 1
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11 3.2. GUIDELINES FOR RECYCLABLE, RE-USABLE, AND SALVAGEABLE WASTE 2
12 3.3. GUIDELINES FOR DISPOSAL OF WASTES 3
13

14 **PART 1 – GENERAL**

15
16 **1.1. SUMMARY**

- 17 A. This specification includes administrative and procedural requirements for the recycling, re-use, salvaging, and
18 disposal of non-hazardous construction and demolition waste.
19 B. The General Contractor (GC) shall be fully responsible for complying with all applicable ordinances and other
20 such regulatory requirements during the execution of this contract.
21

22 **1.2. RELATED SPECIFICAITONS**

- 23 A. 01 33 23 Submittals
24 B. Other Divisions and Specifications that may address the proper disposal of construction or demolition waste as it
25 pertains to work being conducted under that particular specification.
26

27 **1.3. CITY ORDINANCES**

- 28 A. There are two (2) Madison General Ordinances (MGO) that the City of Madison has regarding construction and
29 demolition waste.
30 1. MGO 10.185, Recycling and Reuse of Construction and Demolition Debris, describes the requirements
31 associated with this ordinance including definitions, documentation requirements, and penalties.
32 2. MGO 28.185, Approval of Demolition (Razing, Wrecking) and Removal, describes the requirements
33 associated with applying for and receiving a demolition permit.
34 B. All City of Madison, Board of Public Works, contracts being conducted by City Engineering, Facility Management,
35 for construction, remodeling, or demolition shall comply with the above ordinances regardless of project type or
36 size.
37

38
39 **PART 2 – PRODUCTS – THIS SECTION NOT USED**

40
41 **PART 3 - EXECUTION**

42
43
44 **3.1. GENERAL GUIDELINES FOR ALL WASTES**

- 45 A. Recycle all paper and beverage containers used by workers, sub-contractors, suppliers and visitors to the project
46 site.
47 B. All revenues, savings, rebates, tax credits, and other such incentives received from recycling, reusing, or
48 salvaging waste materials shall accrue to the GC unless specified otherwise in the contract documents.
49 C. Separate recyclable, reusable, and salvageable waste from other waste materials, trash, and debris-
50 1. Separate by type in appropriate containers or designated areas according to the approved waste
51 management plan away from the construction area. Do not store within the drip lines of existing trees.
52 2. Inspect containers and bins frequently for contamination and inappropriately sorted materials. Remove
53 contaminated materials and resort as necessary.
54 3. Stockpile bulk materials such as sand, topsoil, stone, etc., on site away from the construction area and
55 without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water, and
56 cover to prevent windblown dust. Do not store within the drip lines of existing trees.
57 4. Whenever possible store items off the ground and/or protect them from the weather.

1
2 **3.2. GUIDELINES FOR RECYCLABLE, RE-USABLE, AND SALVAGEABLE WASTE**

- 3 A. The following guidelines is not a complete or all-inclusive list and shall be adjusted as needed by the methods
4 and procedures identified in the Waste Management Plan.
- 5 B. Asphalt Paving: Break-up into transportable pieces or grind, transport to an authorized recycling facility.
- 6 C. Carpet and Pad: Separate carpet and pad scraps, containerize and transport to an authorized recycling facility.
- 7 D. Ceiling System Components: Suspended ceiling system components shall be sorted by material type as follows:
8 1. Broken, cut, or damaged tiles shall be containerized, transport to an authorized recycling facility.
9 2. Damaged, or cut tracks, trim and other metal grid system components shall be sorted with other metals
10 of similar types, palletize, transport to an authorized recycling facility.
- 11 E. Clean Fill: When allowed by Division 31 Specifications; concrete, masonry, stone, asphalt pavement, sand and
12 other such materials may be used as clean fill on this project site. The GC shall verify with the Project Engineer,
13 Structural Engineer, or Civil Engineer as necessary prior to using any materials as clean fill. Materials shall be
14 processed, placed, and compacted as specified. If not being re-used on site, transport to an authorized recycling
15 facility.
- 16 F. Clean Wood Materials: Including but not limited framing cutoffs, wood sheathing or paneling materials,
17 structural or engineered wood products, and pallets or crates. Clean Wood shall be free of paints, stains, oils,
18 preservatives and other such contaminates.
19 1. Useable pieces shall be sorted by type and dimension, bundled and transported off site by the GC or
20 returned to the supplier.
21 2. Non-useable pieces shall be palletized or containerized, transport to an authorized recycling facility.
22 3. Clean, uncontaminated sawdust and wood shavings shall be bagged, transport to an authorized recycling
23 facility.
- 24 G. Concrete: Break-up into transportable pieces, remove all reinforcing and other metals, transport to an
25 authorized recycling facility.
- 26 H. Glass Products: Shall be sorted by types, do not include light fixture lamps and bulbs. Products broken in
27 shipment shall be returned to the supplier. Broken or cracked items still in frames shall be taped to prevent
28 further breakage and injury to workers. Transport to an authorized recycling facility.
- 29 I. Gypsum Board: Stack large clean pieces on wooden pallets or container, store in a dry location, transport to an
30 authorized recycling facility.
- 31 J. Light Fixture Lamps and Bulbs: Fluorescent tubes shall be containerized, transport to an authorized recycling
32 facility.
- 33 K. Masonry and CMU: Remove all metal reinforcing, anchors, and ties, clean undamaged pieces and neatly stack on
34 pallets, transport damaged pieces to an authorized recycling facility.
- 35 L. Metals: Sort metals by type as follows, this does not include piping:
36 1. Architectural metals including but not limited to siding, soffit, and roofing panels shall be sorted by
37 material, palletize or bundle as needed and transport to an authorized recycling facility.
38 2. Structural steel, sort by size and type; palletize and transport to an authorized recycling facility.
39 3. Miscellaneous metals such as aluminum, brass, bronze, etc. shall be sorted by type, containerized or
40 palletized as necessary, transport to an authorized recycling facility.
- 41 M. Packaging and shipping materials
42 1. Cardboard boxes and containers: Breakdown all cardboard boxes and containers into flat sheets. Bundle
43 and store in a dry location until transported for recycling.
44 2. Pallets:
45 a. Whenever possible require deliveries using pallets to remove them from the project site.
46 b. Neatly stack pallets in preparation for reusing them or providing them to other companies for
47 salvage or re-use.
48 c. Break down pallets into component wood pieces that comply with the requirements for recycling
49 clean wood materials. Neatly stack or palletize pieces in preparation for transportation.
50 3. Crates: Break down crates into component wood pieces that comply with the requirements for recycling
51 clean wood materials. Neatly stack or palletize pieces in preparation for transportation.
52 4. Polystyrene Packaging: Separate and bag materials.
- 53 N. Piping and conduit: Reduce all piping and conduit to straight lengths, sort and store by size, material and type.
54 Remove supports, hangers, valves, boxes, sprinkler heads, and other such components, sort and store by size,
55 material and type. Transport to authorized recycling facilities according to material types.
- 56 O. Roofing: Roofing materials shall be sorted and containerized by type, transport to authorized recycling facilities
57 according to material types.

- 1 P. Site-Clearing Waste: Sort all site waste by type.
2 1. Only stockpile soils types and quantities required for re-use on the project site. All remaining quantities
3 shall be transported off site to an authorized facility that receives such materials.
4 2. Brush, branches, and trees with no marketable re-use shall be transported to facilities for chipping into
5 mulch.
6 3. Trees with a marketable re-use shall be salvaged and transported to facilities that specialize in processing
7 trees for future use as wood products.
8

9 **3.3. GUIDELINES FOR DISPOSAL OF WASTES**

- 10 A. Any waste that is contaminated, organic, or cannot be recycled, re-used, or salvaged shall be legally disposed of
11 in an authorized landfill or incinerator. Disposal methods shall follow all applicable regulatory requirements.
12 B. No waste material of any kind shall be allowed to be buried on the project site at any time.
13 C. No burning of any kind of waste material shall be permitted on this project site at any time.
14 D. Paint and Stain: Paints, stains, and their containers shall be disposed of as follows:
15 1. Whenever possible containers should be thoroughly cleaned immediately after emptying and sorted with
16 as appropriate (metal or plastic) for recycling
17 2. Empty containers, regardless of type or base material, may be disposed of with lids off with general
18 garbage.
19 3. Latex paint may be placed with general garbage if properly solidified as follows:
20 a. Small amounts (an inch or less in can): Remove lids and allow paint to dry out in the can and
21 harden. Protect cans from rain and freezing.
22 b. Large amounts (more than one inch): Mix paint with equal amounts of cat litter, stir and allow to
23 completely dry. Alternate method: mix with commercial paint hardener.
24 4. Oil-based or combustible paints and stains, regardless of liquid or solid, shall be transported to an
25 approved facility that takes such items such as Dane County Clean Sweep Sites.
26 E. Treated Wood Materials: Treated wood materials including but not limited to wood that has been painted,
27 stained, or chemically treated shall not be recycled or incinerated.
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29
30
31
32

END OF SECTION

SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

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16

PART 1 – GENERAL

1.1. SUMMARY

- 19
20 A. The purpose of this specification is to provide clear responsibilities and guide lines related to providing well
21 documented and complete Operation and Maintenance (O&M) Data related to general facility use, equipment,
22 systems, finishes, and materials to City of Madison Staff (Owner, Owner Representatives, Maintenance, and
23 Custodial Personnel) as needed.
24 B. For primary roofing projects Operation and Maintenance Data shall consist to both of the following categories:
25 1. Operation and Maintenance Data: Generally shall mean the owner manual that provides information on
26 start-up, shut-down, operation, troubleshooting, maintenance, parts, and other such documentation as it
27 pertains to all equipment and systems installed under the Work.
28 2. Use and Care instructions: Where applicable use and care instructions shall also be considered O&M for
29 such things as flooring, tile, partitions, and other such finishes and trim related items, installed under the
30 Work.
31

1.2. RELATED SPECIFICATIONS- THIS SECTION NOT USED

1.3. QUALITY ASSURANCE

- 32
33
34
35 A. All O&M Data shall meet the requirements identified in Section 1.4 below.
36 B. All contractors shall provide O&M Data for each piece of equipment, system, or finish installed during the
37 installation of the Work. O&M Data shall be provided to the General Contractor (GC) for verification and
38 submittal.
39 C. The GC shall be responsible for receiving all required O&M Data files from all contractors for verifying that all
40 files submitted meet the requirements in Section 1.4 below.
41

1.4. O&M DATA REQUIREMENTS

- 42
43 A. O&M Data shall be provided in digital PDF format as follows:
44 1. PDF files shall be complete first generation consumer useable editions of PDF documents as provided by
45 any of the following:
46 a. Product manufacturer
47 b. Supplier of product
48 c. Product manufacturer internet site
49 2. Acceptable PDF files shall have the following functionality:
50 a. Word searchable
51 b. Key areas are bookmarked
52 c. Table of Contents and/or Index linked to content is preferred whenever possible.
53 3. Scanned printed material, with word searchable capabilities, saved as a PDF, is not acceptable and will be
54 rejected without further review.
55 B. O&M Data shall include but not be limited to the following manufacturers' published information as appropriate
56 for the equipment, system, material, or finish:

SECTION 01 78 36
WARRANTIES

1
2
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PART 1 – GENERAL

1.1. SUMMARY

- 19
20 A. The purpose of this specification is to provide clear responsibilities and guide lines related to providing all
21 Warranties and Guarantees related to the Work, workmanship, materials, equipment, and other such items
22 required by the Construction Documents.
23 B. Manufacturers’ disclaimers and limitations on product warranties do not relieve any contractor of the warranty
24 on the Work that includes the product.
25 C. Manufacturers’ disclaimers and limitations on product warranties do not relieve suppliers, manufacturers and
26 any contractor required to provide special warranties under the contract documents.
27

1.2. RELATED SPECIFICATIONS

- 28
29 A. Section 01 78 23 Operation and Maintenance Data
30 B. Other Divisions and Specifications that may address more specifically the requirements for Warranties related to
31 the installation of all items and equipment installed under the execution of the Work.
32

1.3. DEFINITIONS

- 33
34 A. Emergency Repair: The Owner or Owner Representative reserves the right to make emergency repairs as
35 required to keep equipment or materials in operation or to prevent damage to property and injury to persons
36 without voiding the contractors warranty or bond or relieving the contractor of his/her responsibilities during
37 the warranty period.
38 B. Installer: The company or contractor hired to install a finished product that was manufactured and supplied
39 specifically for the Work within this contract. The Installer may or may not be the same company that supplied
40 the product. See the definition for supplier.
41 C. Supplier: Any company that makes a specific finished product for the Work from information within the Contract
42 Documents. Examples of suppliers would include custom cabinets, steel stairs and railings, etc. A supplier would
43 not be a company that distributes items manufactured by others such as an electrical or plumbing supplier.
44 D. Warranty: A written guarantee from the manufacturer to the owner on the integrity of a product and its
45 installation, and the manufacturers’ responsibility to repair or replace the defective product or components
46 within a specified time from the date of ownership. Warranty may also be used interchangeably with
47 Guarantee. The following warranty types may be part of any specification within the Work associated with the
48 Construction Documents:
49 1. Expressed Warranty: A warranty that provides specific repair or replacement for covered components of
50 a product over a specified length of time.
51 2. Implied Warranty: A warranty that is not stated explicitly by a seller or manufacturer that the product is
52 merchantable and fit for the intended purpose.
53 3. Standard Product Warranty: Preprinted written warranties published by individual manufacturers for
54 particular products and are specifically endorsed by the manufacturer to the Owner. Standard warranties
55 may be for any amount of time but shall not be for anything less than one (1) year from the warranty
56 date.

- 1 4. Special Warranty: A written warranty required by the Contract Documents either to extend the time
2 limit provided under a standard warranty or to provide greater rights to the Owner.
3 F. Warranty Date: The effective date that begins all warranty periods required for products, installations, and
4 workmanship associated with the execution of the Work for this contract. The Warranty Date shall be set by the
5 CPM.
6 G. Related Damages and Losses: When correcting failed or damaged Warranted Work, remove and reinstall (or
7 replace if necessary) the construction that has been damaged as a result of the failure or the construction that
8 must be removed and replaced to obtain access for the correction of Warranted Work.
9 H. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected reinstate the
10 warranty by a new written endorsement. The reinstated warranty shall be equal to the original warranty with an
11 equitable adjustment for depreciation unless specifically noted otherwise in a specification.
12 I. Replacement Cost: All costs that may be associated with Work being replaced under warranty including but not
13 limited to the following:
14 1. Related damages and losses
15 2. Labor, material and equipment
16 3. Permits and inspection fees
17 4. This shall be regardless of any benefit the Owner may have had from the Work through any portion of its
18 anticipated useful service life.
19 J. Replacement Work: All materials, products, required labor, and equipment necessary to replace failed or
20 damaged warranted to an acceptable condition that complies with the requirements of the original Construction
21 Documents.
22 K. Owners Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not
23 limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods
24 shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations,
25 rights, and remedies.
26 1. Rejection of Warranties: The Owner reserves the right to reject any warranty and to limit the selection of
27 products with warranties not in conflict with the requirements of the contract documents.
28 2. Where the Contract Documents require a Special Warranty or similar commitment on the Work or
29 product, the Owner reserves the right to refuse acceptance of the Work until the Contractor presents
30 evidence the entities required to countersign such required commitments have done so.

31
32 **1.4. GENERAL CONTRACTORS RESPONSIBILITIES**

- 33 A. The General Contractor (GC) shall be responsible to remedy, at his/her expense, any defect in the Work and any
34 damage to City owned or controlled real or personal property when the damage is a result of:
35 1. The GC's failure to conform to Contract Document requirements.
36 a. Any substitutions not properly approved and authorized may be considered defective.
37 2. Any defect in workmanship, materials, equipment, or design furnished by the GC or Sub-contractors.
38 B. All warranties as described in this specification and these Contract Documents shall take effect on the date
39 established by the CPM, as noted in Section 1.3F above.
40 1. All warranties shall remain in effect for one (1) year thereafter unless specifically stated otherwise in the
41 Contract Documents or where standard manufacturer warranties are greater.
42 C. The GC's warranty with respect to Work repaired or replaced, including restored or replaced Work due to
43 damage, will run for one (1) year from the date of Owner Acceptance of said repair or replacement.
44 1. This shall be regardless of any benefit the Owner may have had from the Work through any portion of its
45 anticipated useful service life.
46 D. Warranty Response
47 1. See Section 3.5 of this specification.

48 **PART 2 – PRODUCTS - THIS SECTION NOT USED**

49
50 **PART 3 - EXECUTION**

51
52 **3.1. WARRANTY CHECKLIST**

- 53 A. All contractors shall be responsible for reviewing the drawings and specifications within their Divisions of Work
54 to provide a complete and comprehensive list of all Warranty Requirements to the GC.
55 B. Each list shall indicate the title (and plan identifier when applicable) of the warranted item, the associated
56 specification of the warranted item, the terms of the warranty (years), and a column to verify the item has been
57 turned in and completed.

- 1 C. The GC shall be responsible for all of the following:
 2 1. Consolidating all the warranty lists into one master Warranty Checklist and submitting electronically.
 3 a. The checklist shall be in a tabular data format similar to the sample below.
 4 2. Resubmit the schedule as needed after initial reviews have been completed.
 5 D. The GC shall work with all contractors to amend the Warranty Checklist throughout the execution of the project
 6 based on changes and modifications as necessary.
 7

<u>Title</u>	<u>Specification</u>	<u>Terms</u>	<u>Completed</u>
Overhead Door Operator	08 36 00	MFR 2yr	
Exterior Bench and Trash Receptacles	12 93 00	MFR 3 year warranty on finish	
Kitchen Sink (SK-1)	22 42 00	MFR 5 year	
Disposal (D-1)	22 42 00	MFR 7 year parts and in-home service	
Toilet (WC-1)	22 42 00	MFR 1 year limited	

8
 9

3.2. LETTERS OF WARRANTY

- 10 A. All letters of warranty shall be in a typed letter format and provide the following information:
 11 1. The letter shall be on official company stationary including company name, address, and phone number.
 12 2. Indicate project name, contract number, and contract address the warranty is for on the reference line.
 13 3. Provide a description of the warranty(ies) being provided.
 14 a. Include Division, Trade, or Specification information as necessary.
 15 b. Only combine warranties of related Divisional Work together. Create new letters for additional
 16 Divisions as necessary.
 17 4. Indicate the effective Warranty Date. As noted in Section 1.3.F above, the Warranty Date shall be the
 18 date the Certificate of Substantial Completion was signed by the City Engineer.
 19 5. Contractor Letters of Warranty shall only be signed by a principal officer of the company.
 20 6. After signing the letter provide the GC with a high quality color scanned image in PDF format and the
 21 original signed letter.
 22 B. The GC shall be responsible for the Final Warranty submittal as identified in Section 3.4 below.
 23 C. The GC shall obtain letters of warranty from all of the following:
 24 1. The General Contractor shall provide warranty letters for all Work that was self-performed under the
 25 contract documents, identify all trades or Divisions of Work.
 26 2. All Sub-contractors shall provide warranty letters for Work performed under the contract documents;
 27 identify all trades or Divisions of Work.
 28 3. Suppliers, as required by other specifications within the Construction Documents where the manufacture
 29 of a specific product unique to the Work of this contract was required.
 30 a. The terms and conditions of the Supplier Letter of Warranty shall be as defined by the
 31 specifications associated with the Work but shall not be less than the industry standard of repair,
 32 or replace defective materials and workmanship within one (1) year of the warranty date.
 33 b. When the supplier is also the installer a single written letter may be submitted identifying both
 34 the warranty for the manufacture of the product and the warranty for the installation of the
 35 product.
 36 4. Installers as required by other specifications within the Construction Documents where the installation of
 37 a specific product unique to the Work of this contract was required.
 38 1. The terms and conditions of the Installer Letter of Warranty shall be as defined by the
 39 specifications associated with the Work but shall not be less than the industry standard of repair,
 40 or replace defective materials and workmanship associated with the installation of the product
 41 within one (1) year of the warranty date.
 42 5. Special Letters of Warranty shall be required from any contractor, supplier, installer or manufacturer who
 43 agrees to provide warranty services required by any Division Specification in excess of their Standard
 44 Product Warranty.
 45

46 **3.3. STANDARD PRODUCT WARRANTY**

- 47 A. All contractors shall be responsible for collecting and providing copies of all standard product warranties for
 48 commercially available products purchased and installed under this contract.
 49 B. Only one copy of the manufacturers' standard warranty needs to be submitted as representative for all
 50 quantities of the same model number used throughout the Work.

- 1 C. Provide the manufacturers certificate, letter, or other standard documentation for each Standard Product
2 Warranty submitted as follows:
3 1. Whenever possible a PDF version of the document shall be used.
4 a. If a PDF version is used all additional information shall be completed using simple PDF editing
5 tools such as text boxes, highlight, etc.
6 b. If a PDF version is not available and an original document is furnished the additional information
7 shall be neatly hand written and highlighted on the document in such a fashion so that it does not
8 obscure any part of the written warranty.
9 2. Provide the following additional information on each warranty document:
10 a. Contract warranty date.
11 b. Provide the manufacturer name and model number of the product if not specified within the
12 warranty.
13 i. Where the manufacturer name and model number is specified within the warranty it shall
14 be highlighted for visibility.
15 c. Provide the plan identifier (LAV-1, WC-2, etc.) when applicable.
16 D. Each completed warranty shall be saved as a digital PDF. The file shall be named using the specification number
17 and item description. I.E. 22 42 00 Toilet (WC-1).pdf
18 a. Where an original certificate was furnished provide a high quality colored scan of the completed
19 document with the additional information. Save the scanned image in PDF format and use the
20 same naming convention as indicated above.
21 E. Provide all PDF files and any original documents to the GC for final consolidation to be provided to the Owner.
22

23 **3.4. FINAL WARRANTY SUBMITTAL**

- 24 A. The GC shall receive all required warranties (digital PDF and any original documents) from all contractors,
25 suppliers, installers and manufacturers.
26 B. The GC shall inventory all received warranties with the Warranty Submittal List to ensure all required warranties
27 have been received and all warranty periods are correct according to the specifications.
28 C. Provide with each Operation and Maintenance Manual a complete copy of any associated warranty.
29 D. Scan all warranties into a single organized electronic PDF file as follows:
30 1. Organize the PDF file into an orderly sequence based on the table of contents of the Specifications.
31 2. Provide a typed Table of Contents for the entire file at the front of the document.
32 3. Provide bookmarks and links to each individual PDF to enable quick navigation through the PDF
33 document.
34 E. Submit electronically, the warranty submittal for review by the PE and CPM.
35 F. Correct any deficiencies or omissions and resubmit as necessary.
36

37 **3.5. WARRANTY NOTIFICATION, RESPONSE, EXECUTION AND FOLLOW-UP**

- 38 A. Not Applicable.
39
40
41

42 **END OF SECTION**
43

SECTION 04525
MASONRY RESTORATION REPOINTING SPECIFICATIONS

PART 1 - GENERAL MASONRY RESTORATION REPOINTING

1.1 SUMMARY OF WORK

- A. Masonry joint repairs to the Metro Bus Garage Roof Replacement Contract shall consist of repointing the defective masonry joints within three feet of where metal cap flashing or counter flashing is to be installed on various brick masonry wall. The contractor shall furnish all materials, tools, equipment, apparatus, transportation, labor and supervision to repoint these defective joints.
- B. Not all masonry joints shall be repaired. The masonry contractor shall inspect all joints in these areas and repair only those joints that meets the criteria of a defective joint. The contractor shall submit a unit cost for the work and shall be paid for actual work performed.
- C. The walls to be repaired shall be; all brick walls located on the existing EPDM roof, excluding the six (6) emergency exits on the north side of the building.

1.1 DEFINITIONS

- A. Repointing: The process of raking out (removing) mortar and replacing it with new mortar.
- B. Pointing: The process of placing new mortar in existing joint spaces, which have previously been raked out. This term does not include the raking out process.
- C. Tuckpointing: The process of touching up existing mortar joints by filling in recesses with new mortar, without first raking out the joints.

1.2 SUBMITTALS

- A. Product data for each product indicated including recommendations for their application and use. Include test reports and certifications substantiating that products comply with requirements.
- B. Samples for verification purposes of the following:
 - 2. Each type of mortar for pointing and masonry rebuilding and repair in the form of sample mortar strips 6 inches long by 1/2 inch wide set in aluminum or plastic channels.
- C. Restoration program for each phase of the restoration process, including protection of surrounding materials on building and site during operations. Describe in detail the materials, methods, and equipment to be used for each phase of the restoration work.

1.3 QUALITY ASSURANCE

- A. Restoration Specialist: Engage an experienced masonry restoration and cleaning firm that has specialized in the types of work required for this Project. At Contractor's option, the work may be divided between two specialist firms: one for cleaning work and one for repair work.
 - 1. Field Supervision: Require restoration specialist firm to maintain an experienced supervisor to oversee the masonry restoration and cleaning progress.

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1.4 PROJECT CONDITIONS

- A. Do not repoint mortar joints or repair masonry unless air temperature is between 40°F (4°C) and 80°F (27°C) and will remain so for at least 48 hours after completion of work.
- B. Prevent grout or mortar used in repointing and repair work from staining face of surrounding masonry and other surfaces. Immediately remove grout and mortar in contact with exposed masonry and other surfaces.
- C. Protect sills, ledges, and projections from mortar droppings.

1.5 SEQUENCING/SCHEDULING

- A. Perform masonry restoration work in the following sequence:
 - 1. Repair existing masonry, including replacing existing masonry with new masonry materials.
 - 2. Rake out existing mortar from joints indicated to be repointed.
 - 3. Repoint existing mortar joints of masonry indicated to be restored.

PART 2 - PRODUCTS

2.0 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I.
 - 1. Provide non-staining white cement complying with staining requirement of ASTM C 91 for not more than 0.03 percent water-soluble alkali.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Aggregate for Mortar: ASTM C 144, unless otherwise indicated.
 - 1. Colored Mortar Aggregate: Natural or manufactured sand selected to produce mortar color indicated.
 - 2. For pointing mortar, provide sand with rounded edges.
 - 3. Match size, texture, and gradation of existing mortar as closely as possible.
- D. Colored Mortar Pigment: Natural and synthetic iron oxides and chromium oxides, compounded for mortar mixes. Use only pigments with record of satisfactory performance in masonry mortars.

2.1 MORTAR MIXES

- A. Measurement and Mixing: Measure cementitious and aggregate material in a dry condition by volume or equivalent weight. Do not measure by shovel, use known measuring containers. Mix materials in a clean mechanical batch mixer.
 - 1. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 1 to 2 hours. Add the remaining water in small portions until reaching mortar of the desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

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- B. Colored Mortar: Produce mortar of color required by using selected ingredients. Do not adjust proportions without Architect's approval.
 - 1. Colored Mortar Pigment: Where colored mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.
- C. Do not use admixtures of any kind in mortar, unless otherwise indicated.
- D. Mortar Proportions: Mix mortar materials in the following proportions:
 - 1. Pointing Mortar for Brick-Type N Mortar: One part white Portland cement, two parts lime, and six parts colored or natural mortar aggregate.
 - a. Add colored mortar pigment to product as required.
 - b. Premixed Type N mortar mixes shall be acceptable for this project. Manufacturer's color samples shall be acceptable when determining color match.

PART 3 - EXECUTION

3.9 REPOINTING MASONRY

- A. Determination of Joints to be Repointed.
 - 1. Not all joints in the masonry will need to be repointed. Repoint any portions of the masonry which contain a defective joints. In some cases where defective joints are in close proximity of each other, the short section of a satisfactory joint (approximately 12 inches or less) may be removed and repointed along with the defective joints.
 - 2. Closely examine the mortar joints in the indicated areas to determine which joints require repointing. Defective joints include joints that are cracked, deteriorated, eroded, contain voids or are poorly bonded to the masonry. Any unsound mortar shall be removed. Clean the selected areas of the masonry to help identify the joints that will need repointing.
 - 3. If the masonry was previously repointed with a mortar which has a higher compressive strength than the adjoining masonry, the previously installed repointing mortar should be removed and the joint repointed.
 - 4. Visually inappropriate, previously installed repointing should be replaced. If color, texture, and joint profile do not match, the joint should be removed and repointed.
 - 6. Remove sealant or other inappropriate material that may have been used to repair the joints of the masonry units and repoint the joint

- A. Rake out joints as follows:
 - 1. Rake out mortar from joints to depths equal to 2-1/2 times their widths but not less than 1/2 inch nor less than that required to expose sound, un-weathered mortar.
 - 2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.

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MASONRY RESTORATION REPOINTING SPECIFICATIONS

3. Do not spall edges of masonry units or widen joints. Replace damaged masonry units.
 - a. Power-operated rotary hand saws and grinders may be used only if the contractor is able to satisfactorily field demonstrate to the Project Manager the ability of the operators to use tools without damaging masonry. The equipment must be sized for the operator in order to satisfactorily control the cutting action with precision. Typically, a center cut would be allowed in the joint with hand removal of the remaining mortar with a chisel to ensure that damage is not done to the masonry units. Any masonry units that are damaged in this process shall be the responsibility of the contractor to repair or replace.
 - b. The contractor shall provide dust containment when using power operated grinders or saws that generate silica dust. The contractor shall field demonstrate safeguards that adequately protect the general public from the hazardous of silica dust.
- B. Point joints as follows:
 1. Rinse/saturate masonry joint surfaces with water to remove dust and mortar particles. Time the rinsing application so that at the time of pointing excess water has evaporated or run off and the joint surfaces are damp but free of standing water.
 2. Apply the first layer of pointing mortar to areas where existing mortar was removed to depths greater than 1 ¼". Apply additional lifts not greater than 1 ¼" until a uniform depth is achieved for the final lift. Compact each layer thoroughly and allow it to become thumbprint hard before applying the next layer.
 3. Repointing mortar may be applied in a single lift if not greater than 1 ¼". After joints have been filled to a uniform depth, place remaining pointing mortar in a single layers. Where existing bricks have rounded edges recess final layer slightly from face. Take care not to spread mortar over edges onto exposed masonry surfaces, or to featheredge mortar.
 4. When mortar is thumbprint hard, tool joints to match original appearance of joints, unless otherwise indicated. Remove excess mortar from edge of joint by brushing.
 5. Cure mortar by maintaining in a damp condition for not less than 72 hours. Spray mist the mortar with water to a condition where it saturates the masonry yet the surface does not contain standing water. Mist with water at least three times throughout the day with a final misting to occur at the end of the work shift.

3.10 FINAL CLEANING

- A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter using stiff nylon or bristle brushes and clean water, which is spray-applied at a low pressure.
- B. Using metal scrapers or brushes is not permitted.
- C. Using acid or alkali cleaning agents is not permitted.

END OF SECTION

SECTION 075323 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. FURNISH AND INSTALL ELASTOMERIC SHEETING ROOFING SYSTEM, EPDM, INCLUDING:
 - 1. Roofing manufacturer's requirements for the specified warranty
 - 2. Preparation of roofing substrates.
 - 3. Wood nailers and blocking for roofing attachments as stated in plans and specifications.
 - 4. Insulation.
 - 5. Elastomeric EPDM membrane roofing.
 - 6. Metal roof edging and coping
 - 7. Roof drains and scuppers.
 - 8. Flashings.
 - 9. Concrete pavers
 - 10. Other roofing –related items specified or indicated on the drawings or otherwise necessary to provide a complete weatherproof roofing system.
- B. Disposal of demolition debris and construction waste is the responsibility of the contractor. Perform disposal in a manner complying with all applications of federal, state, local regulations and sections within this project manual.
- C. Comply with the published recommendations and instruction of the roofing membrane manufacturer.
- D. Commence of work by the contractor shall constitute acknowledgement by the contractor that this specification can be satisfactorily executed, under the project conditions and with all necessary prerequisites for warranty acceptance by roofing membrane manufacturer. Any modification of the Contract Sum will be made in accordance with the stipulations of the contract Documents stated elsewhere.
- E. RELATED REQUIREMENTS:
 - 1. Section 04525 "General Masonry Restoration Repointing" for brick joint repointing.
 - 2. Section 05 31 00 "Steel Decking." For repair and replacement of steel decking

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

SECTION 075323 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

1.4 PRE-BID AND PRE-INSTALLATION MEETINGS

- A. Pre-bid, refer to SECTION d for pre-bid meeting.
- B. Project meeting, SECTION 01 31 19 for pre-installation and project meetings.

1.5 ACTION SUBMITTALS

- A. Product Data Sheets: Provide membrane manufacturer's product data sheets for all components of the roofing system, including insulation and fasteners, comply with the specific requirements with the membrane manufacturer's requirements and recommendations for the system type specified; including data for each product used in conjunction with the roofing membrane.
- B. Installation instructions: Provide manufacturer's instruction to installer, marked up to show exactly how all components will be installed; where instructions allow installer options, clearly indicate which option will be used.
- C. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:
 - 1. Layout and thickness of insulation.
 - 2. Base flashings, membrane terminations, expansion joints, scupper and drain details.
 - 3. Flashing details at penetrations, wall and parapets.
 - 4. Any non-standard detailing such as ductwork penetration for RTU AC 1.
- D. Samples for Verification: For the following products:
 - 1. Roof paver.
 - 2. Paint samples for patching exterior through wall scupper.
 - 3. Metal flashing.

1.6 INFORMATIONAL SUBMITTALS :

- A. Qualification Data: For Installer and Manufacturer.
- B. Manufacturer Certificates:
 - 1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of complying with performance requirements.
 - 2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.
- C. Product Test Reports: For components of roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.
- D. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.

SECTION 075323 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

1. Submittals
 2. As built shop drawings, including a roof plan showing areas of metal deck repair.
 3. Warranties
 4. Include in electronic format as specified under Section 01 78 23 Operation and Maintenance Data.
- B. Certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty. The warranty shall be provided by the primary roofing contractor, not a subcontractor of the primary roofing contractor.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
1. Special warranty includes roof membrane, base flashings, and other components of roofing system with a wind speed coverage rating of 55 mph.
 - a. Limits of liability: No dollar limitation.
 - b. Scope of Coverage: Repair leaks in the roofing system caused by:
 - i. Ordinary wear and tear on the elements.
 - ii. Manufacturing defect in Manufacturer brand materials.

SECTION 075323 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

- iii. Defective workmanship used to install these materials.
 - iv. Damage due to winds up to 55 mph.
 - c. Not Covered
 - i. Damage due to winds in excess of 55 mph.
 - ii. Damage due to hurricanes or tornados.
 - iii. Hail
 - iv. Intentional damage
 - v. Unintentional damage due to normal rooftop inspections, maintenance, or service.
- 2. Warranty Period: 20 years from Date of Substantial Completion.
- B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roof membrane, base flashing, roof insulation, fasteners, roof pavers, for the following warranty period:
 - 1. Warranty Period: Two (2) years from Date of Substantial Completion.

PART 2 – PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing system and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and flashings shall remain watertight.
 - 1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
 - 2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D 3746, ASTM D 4272, or the Resistance to Foot Traffic Test in FM Approvals 4470.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.
- C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:
 - 1. Zone 1 (Roof Area Field): 10 lbs/square foot
 - 2. Zone 2 (Roof Area Perimeter): 12 lbs /square foot
 - a. Location: From roof edge to 12.0 feet inside roof edge.

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3. Zone 3 (Roof Area Corners): 12 lbs /square foot
 - a. Location: 12.0 feet in each direction from building corner
- D. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- E. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.2 ETHYLENE-PROPYLENE-DIENE-TERPOLYMER (EPDM) ROOFING

- A. EPDM Sheet: ASTM D 4637/D 4637M, [Type I, non-reinforced EPDM sheet] with factory-applied seam tape.
 1. Approved Manufacturers:
 - a. Carlisle SynTec Incorporated, PO Box 7000, Carlisle, PA 17013-0925, (800) 479-6832
 - b. Firestone Building Products, 200 4th Avenue South, Nashville TN (800) 428-4442
 - c. Versico Roofing Systems, P.O. Box 1289, Carlisle, PA 17013, (800) 992-7663
 - d. Genflex Roofing Systems, 200 4th Avenue South, Nashville, TN 37201 (800) 443-4272
 - e. John Manville, P. O. Box 5108, Denver, CO 80217-5108 (303) 978.2000
 2. Thickness: **60 nominal**.
 3. Exposed Face Color: **black**
 4. Source Limitations: Obtain components for roofing system from roof membrane manufacturer or manufacturers approved by roof membrane manufacturer.

2.3 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
 1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: 60-mil thick EPDM, partially cured or cured, according to application.
- C. Slip Sheet: Manufacturer's standard, of thickness required for application.
- D. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.
- E. Roof Vents: As recommended by roof membrane manufacturer.
 1. Size: Not less than 4-inch diameter.
- F. Pourable Sealer: Two-part polyurethane, two-color for reliable mixing; Pourable Sealer by manufacturer.
- G. Bonding Adhesive: Manufacturer's standard.

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- H. Seaming Material: Single-component, butyl splicing adhesive and splice cleaner or Manufacturer's standard, synthetic-rubber polymer primer and 3-inch wide minimum, butyl splice tape with release film or Factory-applied seam tape, width as recommended by manufacturer.
- I. Lap Sealant: Manufacturer's standard, single-component sealant, colored to match membrane roofing.
- J. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.
- K. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- L. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, pre-punched.
- M. Ballast Retaining Bar: Perimeter securement system consisting of a slotted extruded-aluminum retention bar with an integrated compression fastening strip.
 - 1. Fasteners: 1-1/2-inch (38-mm) stainless steel fasteners with neoprene washers.
- N. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening components to substrate, and acceptable to roofing system manufacturer.
- O. Sheet Metal Accessories
 - 1. A. Metal Roof Edging and Fascia: Continuous metal edge member serving as termination of roof membrane and retainer for metal fascia; watertight with no exposed fasteners; mounted to roof edge nailer.
 - a. Wind Performance:
 - i. Membrane Pull-Off Resistance: 100 lbs/ft. (1460 N/m), minimum, when tested in accordance with ANSI/SPRI ES-1 Test Method RE-1, current edition.
 - ii. Fascia Pull-Off Resistance: At least the minimum required when tested in accordance with ANSI/SPRI ES-1 Test Method RE-2, current edition.
 - iii. Fascia Pull-Off Resistance: At least the minimum required when tested in accordance with ANSI/SPRI ES-1 Test Method RE-2, current edition.
 - b. Fascia Pull-Off Resistance: At least the minimum required when tested in accordance with ANSI/SPRI ES-1 Test Method RE-2, current edition.
 - c. Description: Two-piece; 45 degree sloped galvanized steel sheet edge member securing top and bottom edges of formed metal fascia; Firestone EdgeGard or equivalent.
 - d. Fascia Face Height: Varies, field measure and refer to plans.

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- e. Fascia Material and Finish: 24 gage, 0.024 inch (0.06 mm) galvanized steel with Kynar 500 finish in manufacturer's standard color; matching concealed joint splice plates; factory-installed protective plastic film.
 - f. Length: 144 inches.
 - g. Functional Characteristics: Fascia retainer supports while allowing for free thermal cycling of fascia.
 - h. Aluminum Bar: Continuous 6063-T6 alloy aluminum extrusion with pre-punched slotted holes; miters welded; injection molded EPDM splices to allow thermal expansion.
 - i. Anchor Bar Cleat: 20 gage, 0.036 inch (0.9 mm) G90 coated commercial type galvanized steel with pre-punched holes.
 - j. Scuppers: Welded watertight
2. Parapet Copings: Formed metal coping with galvanized steel anchor/support cleats for capping any parapet wall; watertight, maintenance free, without exposed fasteners; butt type joints with concealed splice plates; mechanically fastened as indicated; Firestone PTCF or equivalent.
- a. Wind Performance:
 - i. At least the minimum required when tested in accordance with ANSI/SPRI ES-1 Test Method RE-3, current edition.
 - ii. At least the minimum required when tested in accordance with ANSI/SPRI ES-1 Test Method RE-3, current edition.
 - b. At least the minimum required when tested in accordance with ANSI/SPRI ES-1 Test Method RE-3, current edition.
 - c. Description: Coping sections allowed to expand and contract freely while locked in place on anchor cleats by mechanical pressure from hardened stainless steel springs factory attached to anchor cleats; 8 inch wide splice plates with factory applied dual non-curing sealant strips capable of providing watertight seal.
 - d. Material and Finish: 24 gage, 0.024 inch (0.06 mm) thick galvanized steel with Kynar 500 finish in manufacturer's standard color; matching concealed joint splice plates; factory-installed protective plastic film.
 - e. Dimensions:
 - i. Wall Width: As indicated on the drawings.
 - ii. Piece Length: Minimum 144 inches.
 - f. Fasteners: Factory-furnished; electrolytically compatible; minimum pull out resistance of 240 pounds for actual substrate used; no exposed fasteners.

SECTION 075323 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

P. ACCESSORY MATERIALS

1. Wood Nailers: PS 20 dimension lumber, Structural Grade No. 2 or better Southern Pine, Douglas Fir; or PS 1, APA Exterior Grade plywood; pressure preservative treated.
 - a. Width: 3-1/2 inches nominal minimum, as determined during demolition, as indicated on plans or as wide as the nailing flange of the roof accessory to be attached to it.
 - b. Thickness: Same as thickness of roof insulation, as determined during demolition or as indicated on plans.
 2. Roof Drains: Cast iron body, secured cast iron dome, 15" round, bottom outlet, flashing clamp, ravel stop, underdeck clamp, bearing pan, adjustable extension to match insulation thickness, outlet size as indicated on plans.
 - a. Acceptable Manufacturers: Zurn (Z-100), Smith (1010), Wade (3000), Josam (21500), Watts (RD-300), Mifab (R1200)
 3. Lambs Tongue Downspout Nozzle: Bronze Body, Integral Anchoring Flange, removable Stainless Steel Screen, outlet Size 6".
 - a. Acceptable Manufacturers: Zurn (Z-199), Smith (1770), Wade (3940), Josam (25010), Watts (RD-940), Mifab (R1940)
- Q. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, molded pipe boot flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

2.4 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by EPDM roof membrane manufacturer.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
 1. Compressive Strength: 20 psi.
 2. Size: 48 by 96 inches
- C. Thickness:
 1. Base Layer: 1-1/2 inches.
 2. Upper Layer: 2 inches.

2.5 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

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- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
- C. Tapered Insulation: Provide factory-tapered insulation boards as required for drains.

2.6 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation[and cover boards] to substrate, and acceptable to roofing system manufacturer.

2.7 BALLAST

- A. General: Contractor has the option to reuse existing ballast or to supply new. If reusing ballast the contractor may need to supply additional ballast material to provide stated wind uplift protection.
- B. Aggregate Ballast: Smooth, washed, riverbed gravel or other acceptable smooth-faced stone that withstands weather exposure without significant deterioration and does not contribute to membrane degradation, of the following size:
 - 1. Size: ASTM D 448, Size 4, ranging in size from 3/4 to 1-1/2 inches.

2.8 WALKWAYS

- A. Apply at locations as shown on plans.
- B. Walkway Roof Pavers: Heavyweight, hydraulically pressed concrete units, square edged, factory cast for use as roof pavers; absorption not greater than 5 percent, ASTM C 140/C 140M; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance, ASTM C 67; and as follows:
 - 1. Size: 24 by 24 inches. Manufacture pavers to dimensional tolerances of plus or minus 1/16 inch in length, height, and thickness.
 - 2. Weight: 18 lb. /sq. ft.
 - 3. Compressive Strength: 7500 psi, minimum.
 - 4. Colors and Textures: As selected by Owner from manufacturer's standard range.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

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1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Inspect steel decking for buckling, rusting and deterioration. These conditions were identified from the underside of the deck and will be repaired on a unit cost basis per plans and specifications. Identify areas where decking may need to be replaced and consult with the City Project Manager prior to any replacement work. The City shall be responsible for retaining a Structural Engineer to evaluate any structural deck issues. Do not proceed with roof deck repairs without authorization from the City.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 ROOFING INSTALLATION, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions, FM Approvals' RoofNav assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.4 INSULATION INSTALLATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.
- B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Installation Over Metal Decking:
 1. Install base layer of insulation with joints staggered not less than 24 inches in adjacent rows end joints staggered not less than 12 inches in adjacent rows and with long joints continuous at right angle to flutes of decking.

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- a. Locate end joints over crests of decking.
 - b. Where installing composite and non-composite insulation in two or more layers, install non-composite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
 - c. Where installing composite and non-composite insulation in two or more layers, install non-composite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
 - d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches (except for secondary overflow roof drains).
 - i. Trim insulation so that water flow is unrestricted.
 - f. Fill gaps exceeding 1/4 inch with insulation.
 - g. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
 - h. Loosely lay base layer of insulation units over substrate.
2. Install upper layers of insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.
- a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
 - b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
 - c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches (except for secondary overflow roof drains).
 - f. Trim insulation so that water flow is unrestricted.
 - g. Fill gaps exceeding 1/4 inch with insulation.
 - h. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - i. Loosely lay each layer of insulation units over substrate.

3.5 LOOSELY LAID AND BALLASTED MEMBRANE ROOFING INSTALLATION

- A. Loosely lay roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll roof membrane and allow to relax before installing.

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- C. Comply with requirements in SPRI RP-4 for System 1.
- D. Accurately align roof membrane, without stretching, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- E. Apply roof membrane with side laps shingled with slope of deck where possible.
- F. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement.
 - 1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.
 - 2. Apply lap sealant and seal exposed edges of roofing terminations.
 - 3. Apply a continuous bead of in-seam sealant before closing splice if required by roofing system manufacturer.
- G. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape.
 - 1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.
 - 2. Apply lap sealant and seal exposed edges of roofing terminations.
- H. Factory-Applied Seam Tape Installation: Clean and prime surface to receive tape.
 - 1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.
 - 2. Apply lap sealant and seal exposed edges of roofing terminations.
- I. Leave seams uncovered until inspected by roofing system manufacturer.
- J. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- K. Spread sealant or mastic bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.
- L. Aggregate Ballast: Apply uniformly over roof membrane at the rate required by roofing system manufacturer, but not less than the following, spreading with care to minimize possibility of damage to roofing system. Lay ballast as roof membrane is installed, leaving roof membrane ballasted at end of workday.
 - 1. Ballast Weight: Size 4 aggregate, 10 lb. /sq. ft. at field.
 - 2. Ballast Weight: Size 2 4 aggregate, 12 lb. /sq. ft. at corners and perimeter.
- M. Roof-Paver: Install roof-paver according to manufacturer's written instructions and at locations noted on plans.

3.6 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

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- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.7 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of City Project Manager, and to prepare inspection report.
- B. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

3.8 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing system, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to City Project Manager and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.9 MANUFACTURER'S WARRANTY

- A. Provide manufacturer's 20 year warranty as stated above.

3.10 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 - 1. Owner: City of Madison
 - 2. Address: 210 Martin Luther King Jr. Blvd. Madison WI 53703
 - 3. Building Name/Type: Madison Metro Bus Garage

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4. Address: 1-35 Ingersoll St. Madison WI 53703
 5. Area of Work: EPDM Roofing System, Approx. 165,000 sq. ft. Includes 20 ft. by 30 ft. Outbuilding. Less emergency six (6) exit doors roofs.
 6. Acceptance Date:
 7. Warranty Period 2 years.
 8. Expiration Date:
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. lightning;
 - b. peak gust wind speed exceeding 55 mph;
 - c. fire;
 - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. vapor condensation on bottom of roofing; and
 - g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
 2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.

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4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____.
2. Name: _____.
3. Title: _____.

END OF SECTION 075323

SECTION 05 31 00 - STEEL DECKING

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Metal roof deck

1.2 QUALITY ASSURANCE

- A. Design deck layout, spans, fastening, and joints under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the project is located.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum five (5) years of documented experience and approved by manufacturer.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, cellular raceways and outlet box locations, pertinent details, and accessories.
- B. Product Data: Provide deck profile characteristics, dimensions, structural properties, and finishes.
- C. Certificates: Certify that products furnished meet or exceed specified requirements.
- D. Submit manufacturer's installation instructions.
- E. Welder's Certificates: Certify welders employed on the work, verifying AWS qualifications within the previous twelve (12) months.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Cut plastic wrap to encourage ventilation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Steel Deck:
 - 1. Nucor-Vulcraft Group: <http://www.vulcraft.com/>
 - 2. Canam Steel Corporation: <http://www.canam-construction.com/en/>
 - 3. Substitutions: See Section 01 60 00 – Product Requirements.

2.2 STEEL DECK

- A. All Deck Types:
 - 1. Maximum Vertical Deflection of Roof Deck: 1/240 of span.
- B. Roof Deck: Fluted steel sheet:
 - 1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.

2. Span Design: over two (2) spans minimum
3. Minimum Metal Thickness, Excluding Finish: 20 gauge
4. Nominal Height: 1½ inches.
5. Profile: Fluted, SDI Narrow Rib (Vulcraft - type A).
6. Formed Sheet Width: 36 inches.
7. Side Joints: Lapped, sidelap Hilti – “SLC” Fasteners at 36” o/c min, or weld at 18” o/c
8. End Joints: Lapped, 3/4 pattern with Hilti X-ENP-19 L15 fasteners
9. Fire Resistance Classification: Comply with designation as indicated on drawings.

2.3 ACCESSORY MATERIALS

- A. Bearing Plates and Angles: ASTM A36/A36M steel, unfinished
- B. Welding Materials: AWS D1.1
- C. Fasteners: Galvanized hardened steel, self-tapping
- D. Weld Washers: Mild steel, uncoated, 3/4-inch outside diameter, 1/8 inch thick
- E. Shop and Touch-up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- F. Touch-up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.
- G. Flute Closures: Closed cell foam rubber, 1-inch thick; profiled to fit tight to the deck.

2.4 FABRICATED DECK ACCESSORIES

- A. Cant Strips: Formed sheet steel, 16 gage thick, 45 degree slope, 3½-inch nominal width and height, flange for attachment.
- B. Roof Sump Pans: 14 gage sheet steel, flat bottom, sloped sides, recessed 1½ inches below roof deck surface, bearing flange 3 inches wide, sealed watertight.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions prior to beginning work.
- B. Verify plan locations for added roof decking above the original at buckled deck locations, per insulation removal.

3.2 INSTALLATION

- A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level above existing type B deck.
- B. On steel supports provide minimum 1-1/2 inch bearing.
- C. Where deck repair width is less than 12 inches wide, use new deck and patch according to construction details.
- D. Fasten deck to steel support members at ends and intermediate supports at 12 inches on center maximum, parallel with the deck flute, through existing roof deck, and at each transverse flute using methods specified.

- a. Welding: Use fusion welds through weld washers.
 - b. Place and secure special deep fluted sections for integral concrete bridging.
- E. Clinch lock seam side laps.
 - F. At mechanically fastened male/female side laps fasten at 36 inches on center maximum.
 - G. Drive mechanical sidelap connectors completely through adjacent lapped sheets; positively engage adjacent sheets with minimum three-thread penetration.
 - H. At welded male/female side laps weld at 18 inches on center maximum.
 - I. Weld deck in accordance with AWS D1.3/D1.3M.
 - J. At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings to close openings.
 - K. Close openings above walls and partitions perpendicular to deck flutes with single row of foam cell closures.
 - L. Place metal cant strips in position and fusion weld.
 - M. Position roof drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.
 - N. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

END OF SECTION 05 31 00



P.O. Box 708 • Poynette, WI 53955
Phone: (608) 635-8491 • Email: Office@aaenv.com • Fax: (608) 635-9717
RESULTS

October 13, 2017

Paul Stauffer
City of Madison
210 MLK, Jr. Blvd.
Madison, WI 53703-3342
(608) 266-4366, Cell (608) 575-5270
PStauffer@cityofmadison.com

RE: 135 South Ingersoll Street, Madison, WI 53703

On October 9, 2017 bulk samples were collected of roofing materials from the building located at 135 South Ingersoll Street in Madison, WI to determine if asbestos is present. The bulk samples were analyzed for asbestos content by polarized light microscopy (PLM). Five samples were previously collected on February 1, 2017.

Samples 17 and 21 were reported to contain > 1% asbestos. Sample 17 was collected from the flashing on air handler HV-15. Sample 21 was collected from a vent located north of air handler HV-15. The same gray material is also present on the vent next to it. During the inspection this gray tar like flashing material was only present on air handler HV-15 and the two vents.

On the northeast portion of the roof east of EF34 and EF33 there is a Metalbestos chimney coming from the pressure washer. This material is unable to be tested without damaging the outer jacket therefore the chimney is assumed to contain asbestos.

All other samples collected of the following roofing materials were reported as no asbestos detected.

1. Black roofing caulk on rubber
2. Black roofing felt on parapet
3. Roofing tar on parapet
4. Yellow glue under tar and felt
5. Perlite
6. Black felt on the urethane insulation
7. Yellow glue holding the rubber roofing to the brick, metal, and wood
8. Cream caulking on roof vents

9. Gray caulking holding the metal starter/flashing strips to the walls
10. Gray caulking on roof vents EF24 and other vents in the area
11. Gray caulking on upper ducts EF33 and EF34
12. Black glue on flashing LN2, Sampled 2/1/2017
13. Black tar on top of expansion joint, Sampled 2/1/2017
14. Gray coating over urethane on saw tooth roof, Sampled 2/1/2017

Comments: the gray asbestos flashing material on HV-15 and the two roof vents is Non Friable Category II asbestos in good condition. The total quantity is estimated at 35 Sq Ft.

A&A Environmental Services Inc.'s inspectors are only able to inspect open, safe, and accessible areas inside and outside of the building. Inaccessible suspect material may be hidden throughout this building. Any additional suspect materials discovered during the course of abatement/demolition/remodeling must be assumed to be ACM until sampled by and EPA/State of Wisconsin certified asbestos inspector and proven negative.

If you have any questions concerning this report or the sampling performed please feel free to contact me.

Sincerely,



Ryan Sopha
President/Inspector #AII01851

Encl

RAS/bls



October 12, 2017

A & A Environmental Services
PO Box 708
Poynette, WI 53955

CLIENT PROJECT: 135 S. Ingersoll; 276
CEI LAB CODE: A17-14285

Dear Customer:

Enclosed are asbestos analysis results for PLM Bulk samples received at our laboratory on October 10, 2017. The samples were analyzed for asbestos using polarizing light microscopy (PLM) per the EPA 600 Method.

Sample results containing >1% asbestos are considered asbestos-containing materials (ACMs) per EPA regulatory requirements. The detection limit for the EPA 600 Method is <1% asbestos by weight as determined by visual estimation.

Thank you for your business and we look forward to continuing good relations. If you have any questions, please feel free to call our office at 919-481-1413.

Kind Regards,

A handwritten signature in black ink, appearing to read "Tianbao Bai".

Tianbao Bai, Ph.D., CIH
Laboratory Director





ASBESTOS ANALYTICAL REPORT
By: Polarized Light Microscopy

Prepared for

A & A Environmental Services

CLIENT PROJECT: 135 S. Ingersoll; 276

CEI LAB CODE: A17-14285

TEST METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

REPORT DATE: 10/12/17

TOTAL SAMPLES ANALYZED: 41

SAMPLES >1% ASBESTOS: 2

TOTAL LAYERS ANALYZED: 41

TEL: 866-481-1412

www.ceilabs.com



Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: 135 S. Ingersoll; 276

CEI LAB CODE: A17-14285

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
1		A2515337	Black	Roofing Caulk Over Rubber	None Detected
2		A2515338	Black	Roofing Paper Felt	None Detected
3		A2515339	Black	Roofing Tar	None Detected
4		A2515340	Yellow, Tan	Glue	None Detected
5		A2515341	Black	Perlite	None Detected
6		A2515342	Black	Tarpaper	None Detected
7		A2515343	Black	Tar Material	None Detected
8		A2515344	Brown	Hard Board	None Detected
9		A2515345	Brown	Perlite	None Detected
10		A2515346	Black	Felt	None Detected
11		A2515347	Black	Caulking	None Detected
12		A2515348	Yellow	Glue	None Detected
13		A2515349	Brown	Perlite	None Detected
14		A2515350	Black	Felt	None Detected
15		A2515351	Black	Roof Protection	None Detected
16		A2515352	Yellow	Glue	None Detected
17		A2515353	Gray	Flashing	Chrysotile 10%
18		A2515354	Brown	Perlite	None Detected
19		A2515355	Black	Felt	None Detected
20		A2515356	Cream	Caulking	None Detected
21		A2515357	Gray	Flashing	Chrysotile 10%
22		A2515358	Black	Caulk	None Detected
23		A2515359	Black	Flashing Material	None Detected
24		A2515360	Black	Flashing Material	None Detected
25		A2515361	Black	Caulking	None Detected
26		A2515362	Yellow	Glue	None Detected
27		A2515363	Yellow	Glue	None Detected
28		A2515364	Black	Flashing	None Detected
29		A2515365	Gray	Flashing	None Detected
30		A2515366	Gray	Flashing	None Detected
31		A2515367	Gray	Caulking	None Detected



Asbestos Report Summary

By: POLARIZING LIGHT MICROSCOPY

PROJECT: 135 S. Ingersoll; 276

CEI LAB CODE: A17-14285

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

Client ID	Layer	Lab ID	Color	Sample Description	ASBESTOS %
32		A2515368	Black	Caulking	None Detected
33		A2515369	Yellow	Glue	None Detected
34		A2515370	Yellow	Glue	None Detected
35		A2515371	Yellow	Glue	None Detected
36		A2515372	Yellow	Glue	None Detected
37		A2515373	Black	Caulk	None Detected
38		A2515374	Gray	Caulking	None Detected
39		A2515375	Black	Caulking	None Detected
40		A2515376	Black	Caulking	None Detected
41		A2515377	Gray	Caulking	None Detected



ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: A & A Environmental Services
 PO Box 708
 Poynette, WI 53955

CEI Lab Code: A17-14285
Date Received: 10-10-17
Date Analyzed: 10-11-17
Date Reported: 10-12-17

Project: 135 S. Ingersoll; 276

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS			ASBESTOS %	
			Fibrous	Non-Fibrous			
1 A2515337	Roofing Caulk Over Rubber	Heterogeneous Black Non-fibrous Bound	100%	Caulk		None Detected	
2 A2515338	Roofing Paper Felt	Heterogeneous Black Fibrous Bound	70%	Cellulose	30%	Tar	None Detected
3 A2515339	Roofing Tar	Heterogeneous Black Non-fibrous Bound	100%	Tar		None Detected	
4 A2515340	Glue	Heterogeneous Yellow, Tan Non-fibrous Bound	100%	Mastic		None Detected	
5 A2515341	Perlite	Heterogeneous Black Fibrous Bound	30%	Cellulose	70%	Perlite	None Detected
6 A2515342	Tarpaper	Heterogeneous Black Fibrous Bound	70%	Cellulose	30%	Tar	None Detected
7 A2515343	Tar Material	Heterogeneous Black Non-fibrous Bound	100%	Tar		None Detected	



ASBESTOS BULK ANALYSIS

By: POLARIZING LIGHT MICROSCOPY

Client: A & A Environmental Services
 PO Box 708
 Poynette, WI 53955

CEI Lab Code: A17-14285
Date Received: 10-10-17
Date Analyzed: 10-11-17
Date Reported: 10-12-17

Project: 135 S. Ingersoll; 276

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS				ASBESTOS %
			Fibrous	Cellulose	Non-Fibrous		
8 A2515344	Hard Board	Heterogeneous Brown Fibrous Bound	100%	Cellulose			None Detected
9 A2515345	Perlite	Heterogeneous Brown Fibrous Bound	30%	Cellulose	70%	Perlite	None Detected
10 A2515346	Felt	Heterogeneous Black Fibrous Bound	70%	Cellulose	28%	Tar Foam	None Detected
11 A2515347	Caulking	Heterogeneous Black Non-fibrous Bound			100%	Caulk	None Detected
12 A2515348	Glue	Heterogeneous Yellow Non-fibrous Bound			85%	Mastic Calc Carb	None Detected
13 A2515349	Perlite	Heterogeneous Brown Fibrous Bound	30%	Cellulose	70%	Perlite	None Detected
14 A2515350	Felt	Heterogeneous Black Fibrous Bound	70%	Cellulose	28%	Tar Foam	None Detected



ASBESTOS BULK ANALYSIS

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ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS			ASBESTOS %	
			Fibrous		Non-Fibrous		
15 A2515351	Roof Protection	Heterogeneous	75%		Tar	None Detected	
		Black	25%		Silicates		
		Non-fibrous					
		Bound					
16 A2515352	Glue	Heterogeneous	85%		Mastic	None Detected	
		Yellow	15%		Calc Carb		
		Non-fibrous					
		Bound					
17 A2515353	Flashing	Heterogeneous	75%		Tar	10% Chrysotile	
		Gray	15%		Calc Carb		
		Fibrous					
		Bound					
18 A2515354	Perlite	Heterogeneous	30%	Cellulose	70%	Perlite	None Detected
		Brown					
		Fibrous					
		Bound					
19 A2515355	Felt	Heterogeneous	70%	Cellulose	25%	Tar	None Detected
		Black			5%	Foam	
		Fibrous					
		Bound					
20 A2515356	Caulking	Heterogeneous			100%	Caulk	None Detected
		Cream					
		Non-fibrous					
		Bound					
21 A2515357	Flashing	Heterogeneous	75%		Tar	10% Chrysotile	
		Gray	15%		Calc Carb		
		Fibrous					
		Bound					



ASBESTOS BULK ANALYSIS

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Project: 135 S. Ingersoll; 276

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
22 A2515358	Caulk	Heterogeneous Black Non-fibrous Bound	95% 5%	Caulk Binder	None Detected
23 A2515359	Flashing Material	Heterogeneous Black Non-fibrous Bound	85% 15%	Tar Calc Carb	None Detected
24 A2515360	Flashing Material	Heterogeneous Black Non-fibrous Bound	85% 15%	Tar Calc Carb	None Detected
25 A2515361	Caulking	Heterogeneous Black Non-fibrous Bound	85% 15%	Caulk Calc Carb	None Detected
26 A2515362	Glue	Heterogeneous Yellow Non-fibrous Bound	85% 10% 5%	Mastic Calc Carb Silicates	None Detected
27 A2515363	Glue	Heterogeneous Yellow Non-fibrous Bound	85% 15%	Mastic Calc Carb	None Detected
28 A2515364	Flashing	Heterogeneous Black Non-fibrous Bound	85% 15%	Tar Calc Carb	None Detected



ASBESTOS BULK ANALYSIS

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Project: 135 S. Ingersoll; 276

ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS		
			Fibrous	Non-Fibrous	%		
29 A2515365	Flashing	Heterogeneous Gray Fibrous Bound	10%	Fiberglass	15%	Calc Carb 75% Binder	None Detected
30 A2515366	Flashing	Heterogeneous Gray Fibrous Bound	10%	Fiberglass	15%	Calc Carb 75% Binder	None Detected
31 A2515367	Caulking	Heterogeneous Gray Non-fibrous Bound			100%	Caulk	None Detected
32 A2515368	Caulking	Heterogeneous Black Non-fibrous Bound			100%	Caulk	None Detected
33 A2515369	Glue	Heterogeneous Yellow Non-fibrous Bound			85%	Mastic 15% Calc Carb	None Detected
34 A2515370	Glue	Heterogeneous Yellow Non-fibrous Bound			85%	Mastic 15% Calc Carb	None Detected
35 A2515371	Glue	Heterogeneous Yellow Non-fibrous Bound			85%	Mastic 15% Calc Carb	None Detected



ASBESTOS BULK ANALYSIS

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ASBESTOS BULK PLM, EPA 600 METHOD

Client ID Lab ID	Lab Description	Lab Attributes	NON-ASBESTOS COMPONENTS		ASBESTOS %
			Fibrous	Non-Fibrous	
36 A2515372	Glue	Heterogeneous Yellow Non-fibrous Bound	85% 15%	Mastic Calc Carb	None Detected
37 A2515373	Caulk	Heterogeneous Black Non-fibrous Bound	100%	Caulk	None Detected
38 A2515374	Caulking	Heterogeneous Gray Non-fibrous Bound	100%	Caulk	None Detected
39 A2515375	Caulking	Heterogeneous Black Non-fibrous Bound	100%	Caulk	None Detected
40 A2515376	Caulking	Heterogeneous Black Non-fibrous Bound	100%	Caulk	None Detected
41 A2515377	Caulking	Heterogeneous Gray Non-fibrous Bound	100%	Caulk	None Detected



LEGEND: Non-Anth = Non-Asbestiform Anthophyllite
 Non-Trem = Non-Asbestiform Tremolite
 Calc Carb = Calcium Carbonate

METHOD: EPA 600 / R93 / 116 and EPA 600 / M4-82 / 020

REPORTING LIMIT: <1% by visual estimation

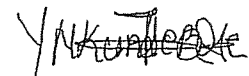
REPORTING LIMIT FOR POINT COUNTS: 0.25% by 400 Points or 0.1% by 1,000 Points

REGULATORY LIMIT: >1% by weight

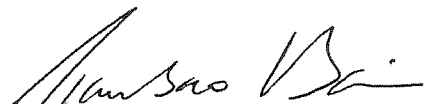
Due to the limitations of the EPA 600 method, nonfriable organically bound materials (NOBs) such as vinyl floor tiles can be difficult to analyze via polarized light microscopy (PLM). EPA recommends that all NOBs analyzed by PLM, and found not to contain asbestos, be further analyzed by Transmission Electron Microscopy (TEM). Please note that PLM analysis of dust and soil samples for asbestos is not covered under NVLAP accreditation. Estimated measurement of uncertainty is available on request.

This report relates only to the samples tested or analyzed and may not be reproduced, except in full, without written approval by CEI Labs, Inc. CEI Labs makes no warranty representation regarding the accuracy of client submitted information in preparing and presenting analytical results. Interpretation of the analytical results is the sole responsibility of the client. Samples were received in acceptable condition unless otherwise noted. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.

ANALYST: _____


Yvette Nkunde-Bose

APPROVED BY: _____


Tianbao Bai, Ph.D., CIH
Laboratory Director



END OF PROJECT MANUAL
MADISON METRO BUS GARAGE – ROOF REPLACEMENT
CONTRACT # 8064