

**CM/GC CONSTRUCTION CONTRACT
SULLIVAN GATEWAY REHABILITATION PHASE 3**

CONTRACT AND AGREEMENT

THIS AGREEMENT is made between the **CITY AND COUNTY OF DENVER**, a municipal corporation of the State of Colorado (the “City”) and **SPECTRUM GENERAL CONTRACTORS, INC.**, a Colorado corporation, whose address is 5135 East 38th Avenue, Denver, Colorado 80207 “the Contractor,” jointly “the parties.”

RECITALS

1. The City wishes to commence Phase 3 of the Sullivan Gateway rehabilitation project which includes the restoration of the east curved wall and east monument:

**SULLIVAN GATEWAY REHABILITATION PHASE 3
CONTRACT CONTROL NO. 201946720
(the “PROJECT”)**

2. In furtherance of the Project, the City has contracted with Spectrum General Contractors, Inc. (the “Designers or Design Consultants or Consultant Team”) to perform professional engineering and design services for the programming and design of the Project.

3. Pursuant to Section 20-56 of the Denver Revised Municipal Code, on May 9, 2018, the City commenced and advertised for at least three (3) consecutive days, the City’s solicitation for qualification submissions from qualified contractors for the Project.

4. The City’s solicitation sought a contractor to furnish all Construction Manager/General Contractor (“CM/GC”) pre-construction and construction experience, expertise and services; and all construction administration, management, supervision, coordination and project construction experience and expertise; and all construction services, work effort, labor, tools, supplies, manufactured components, equipment, materials, and everything else necessary and required to assist in the Project design and to complete the construction of the Project on an expedited basis and within budget; while satisfying the City’s longstanding commitment to quality, efficiency, value, innovation, partnering, responsiveness to agency and community needs and compliance with all applicable regulatory requirements in the performance of general public improvements.

5. Submissions received pursuant to said advertisement were evaluated and formal proposals were requested from selected firms best meeting the City’s qualifications criteria for this Project.

6. Proposals received were evaluated and ranked by a selection committee and a recommendation was made to the Executive Director of Public Works who evaluated the Proposals and recommended that a contract or contracts for performance on the Project be made and entered into with the above named Contractor. The terms “Executive Director of Public

Works”, ”Executive Director”, “Manager of Public Works” and “Manager” are interchangeable and shall have the same meaning.

7. The Contractor has reviewed the Project Site and design documents and has performed constructability, availability, scheduling and cost estimating analysis on design documents prepared for the Project.

8. Based on this performance, the Contractor is thoroughly informed about the Project and the Project design. Contractor has submitted and the City has accepted a GMP to construct the (“Project”).

9. As a consequence of the Project’s time limitations and in order to maintain the existing Project schedule, the Contractor and the City now desire to enter into a Construction Manager/General Contractor contract (the “Construction Contract”) for a Guaranteed Maximum Price (the “GMP”) for all of the Work necessary to complete the Project.

10. The Contractor is willing, able and has the present capacity to perform the construction phase services, as an independent contractor, in accordance with this Construction Contract, said advertisement, and the referenced selection documents.

NOW THEREFORE, in consideration of the compensation to be paid the Contractor, the mutual agreements hereinafter contained, and subject to the terms hereinafter stated, it is mutually agreed as follows:

1.0 PROJECT SUMMARY AND DEFINITIONS:

1.1 Project. The “Project” as used herein shall mean the: Sullivan Gateway Rehabilitation Phase 3.

PROJECT NAME

1.1.1 The Project is located at 2551 East Colfax Avenue.

1.1.2 The specific details of the Project are more particularly set forth in the 100% Percent Bid Package Document drawings prepared by the Designer and dated March 8, 2018.

1.1.3 Contractor Selection. In accordance with the requirements of Section 20-56 of the Denver Revised Municipal Code (the “**DRMC**”), the City implemented and completed a competitive selection process to identify qualified Contractors to perform construction services for the Project. The Contractor was selected as the first ranked proposer to perform such services for the City as set forth in the City’s Request for Proposal (RFP) dated July 18, 2018; and the Contractor’s RFP Submittal dated August 5, 2018. In referencing these solicitations and submissions herein, the City and the Contractor acknowledge that the scope of the Project, as presented and addressed by these documents, has materially evolved since the issuance of these documents and that some

information presented will not be applicable to this Construction Contract or the Project.

1.2 Budget. The Contractor acknowledges and accepts that there are limited funds available to design and construct the Project. The Project construction budget (the “Budget”) is **ONE MILLION NINE HUNDRED SEVEN THOUSAND THREE HUNDRED TWENTY-FIVE DOLLARS AND FORTY-FOUR CENTS (\$1,907,325.44)** and is subject to increase or decrease at the sole discretion of the Executive Director of Public Works. The Contract further acknowledges and accepts that the GMP Work must be completed within the construction budget. As part of this acknowledgment and acceptance, the Contractor shall at all times cooperate fully with the City and the Design Consultant to develop the Project and its various components for construction and ultimately construct the Project so as not to exceed the limited funds available in the Project Budget.

1.3 Project Format. In the performance of this Construction Contract, the Contractor acknowledges and accepts that, scope and schedule are critical for Project delivery. Based on these considerations, the City has elected to utilize a Construction Manager/General Contractor (“**CM/GC**”) project delivery approach and will fast track the Project.

1.3.1 The Contractor is familiar with this approach and understands that the CM/GC method is a specialized and rigorous delivery approach requiring maximum cooperation between all parties. As a consequence of the delivery approach, the Contractor acknowledges and accepts the following: (1) that the complete services to be rendered by the Contractor, the organizational and process inter-relationships governing construction and the construction cost, schedule and sequencing are either in the developmental stage or have not yet been fully defined; and (2) that portions of the Project could have their design completed as separate phases.

1.3.2 In preparing and submitting the GMP Proposal, the Contractor understands, confirms and agrees that its responsibility under this CM/GC approach is to construct the Project in accordance with the Contract Documents.

1.3.3 Subject to any allowed contingency provided for in Section 1.5, the Contractor further acknowledges and agrees the GMP fully accounts for any risks associated with failing to consider the design intent reasonably inferable from the Contract Documents. The Contractor has documented in the Basis of the GMP Proposal and provided or will provide to the City any and all clarifications regarding the design intent, including the intended level of quality of the Project. No GMP increase or extension of the Contract Time will be allowed to account for any assumption, exclusion and clarification the Contractor failed to document or for any other item of Work covered by the Contract Documents that the Contractor failed to account for in its GMP.

1.4 Allowances. The allowances set forth in the GMP Proposal have been accepted by the Project Manager. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the City may direct, but the Contractor shall not be required to employ any persons or entities against which the Contractor may make reasonable objection. The Contractor may also supply allowances for those items the Contractor and the Project Manager mutually determine require an allowance. **Exhibit M** (GMP Proposal) sets forth all allowances applicable to the Work. Unless otherwise provided for in the Contract Documents:

1.4.1 Materials and equipment under an allowance shall be selected promptly by the City to avoid delay in the Work;

1.4.2 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the Project site and all required taxes, less applicable trade discounts;

1.4.3 Contractor's costs for unloading and handling at the Project site, labor, installation costs, and other expenses contemplated for the stated allowance amounts are included in the allowances. However, Contractor's home office overhead and profit for all allowance items are included in the Contractor's Fee and are not in the allowance; and

1.4.4 Whenever costs are more than or less than the allowances, the GMP shall be adjusted accordingly by change order. The amount of the change order shall reflect the difference between actual costs and the allowances. If actual costs exceed allowances, the change order shall include Fee on the difference in accordance with allowable Contractor Fee under the Construction Contract.

1.5 Contingency.

1.5.1 Construction Contingency Amount. The GMP will include a construction contingency in an amount equal to a lump sum of **FIFTY-TWO THOUSAND EIGHT HUNDRED FIFTY-TWO DOLLARS AND TWENTY-TWO CENTS (\$52,852.22)** ("GMP Contingency") for the entire scope of the GMP Work.

1.5.2 Contingency Accounting. The GMP Proposal is not a line item GMP. During the course of the Work, some GMP line items may exceed the estimated amounts and others may under run the estimated amounts shown in the GMP Proposal without impacting the overall GMP. The Contractor may charge to the Contingency any costs which are properly reimbursable as Cost of the Work, but not the basis for a Change Order. These costs may include costs attributable to errors and omissions by the Contractor; costs to correct defective, nonconforming or damaged work; costs generated from clarification of the Contract Documents; costs for code changes or code upgrades required by governmental agencies which are not otherwise the basis for a change order; overtime and acceleration costs to meet contract schedule; and costs, including legal fees, for contractual

disputes, with parties other than the City. The Contingency shall be increased to the extent that there are underruns in budget items included in the GMP. The Contractor shall notify the Project Manager, in writing, of each such charge to or credit of the contingency prior to taking such action and shall provide a periodic reconciliation of contingency credits and expenditures in a format acceptable to the Project Manager.

1.5.3 Contingency Management. The Contractor acknowledges that, subject to available funding, it is the desire of the City to incorporate as many additional Work items into the Work as reasonable or otherwise increase the Work to be performed by the Contractor to enhance the Project. The Contractor agrees to accept a mutually agreeable reduction of the contingency whenever the City and the Contractor reasonably agree that the Project risk is substantially decreased and such agreement shall not be unreasonably withheld.

1.5.4 Owner's Contingency Amount. The GMP will include an Owner's Contingency in an amount equal to a lump sum of **FORTY-SEVEN THOUSAND NINE HUNDRED SEVENTY-NINE DOLLARS AND TWELVE CENTS (\$47,979.12)** ("Owner's Contingency"). Adjustments to owner's contingency to be made by written agreement.

1.5.5 Owner's Contingency Accounting. The Owner's Contingency will be used at the sole discretion of the City for changes to the scope of work that are initiated and requested by the City, unforeseen conditions and for overruns in Allowances. This contingency shall not be used for any other purpose other than scope changes initiated by the City. Any unused portion of this Owner's Contingency shall be returned to the City upon project completion.

1.6 Design Consultant. The "Design Consultant" or "Designer" as used herein shall mean the legally approved professional architect/engineer, or group or association or professional corporation or joint venture of such approved professional architects, engineers and/or consultants, who have contracted with the City to accomplish the architectural, engineering and other design and related technical services necessary to complete the Project. The Project Design Consultant is: Jacobs Engineering Group.

In case of termination of the Design Consultant, the City will appoint a Design Consultant whose status under the Construction Contract shall be the same as that of the former Design Consultant.

1.7 User Agency. The "User Agency" as used herein shall mean the City agency currently responsible for the operation and maintenance of the Project. The User Agency is the City and County of Denver Department of Public Works.

1.8 Construction Team. The Contractor, the City, and the Design Consultant, called the "Construction Team," shall work together to complete the Project. The Contractor shall provide leadership to the Construction Team on all matters relating to Construction.

2.0 CONTRACT DOCUMENTS:

2.1 It is agreed by the parties hereto that the following list of instruments, drawings and documents which are attached hereto, bound herewith or incorporated herein by reference constitute and shall be referred to as the “Contract Documents” and all of said instruments, drawings and documents taken together as a whole constitute the Contract and Agreement between the parties hereto, and they are as fully a part of this Contract and Agreement as if they were set out verbatim and in full herein. The Contract Documents represent the entire and complete integration of all understandings between the City and the Contractor and supersedes all prior negotiations, representations or agreements. No prior or contemporaneous addition, deletion or other amendment hereto shall have any force or effect whatsoever, unless embodied herein in writing. No subsequent novation, renewal, addition, deletion or other amendment hereto shall have any force or effect unless embodied in a written amendatory or other agreement or change order properly executed by the parties. When the Contract Drawings and Technical Specifications are complete and issued by the Design Consultant for construction, they will be incorporated into this Construction Contract as if fully set forth herein as **Exhibits K and L**.

Advertisement of Notice of Invitation for Qualifications, dated May 9, 2018 (incorporated herein by reference)

Request for Proposals (RFP), dated July 18, 2018 (incorporated by reference)

Contractor Response to RFP, dated August 5, 2018 (incorporated by reference)

General Contract Conditions (incorporated by reference; table of contents attached as **Exhibit A**)

Special Contract Conditions (attached as **Exhibit B**)

Minority/Women Owned Business Enterprise Program Compliance Plan (attached as **Exhibit C**)

Equal Employment Opportunity Provisions (attached as **Exhibit D**)

Prevailing Wage Rate Schedule(s) (attached as **Exhibit E**)

Performance and Payment Bond (attached as **Exhibit F**)

Final/Partial Lien Release Form (attached as **Exhibit G**)

Notice to Proceed Form (attached as **Exhibit H**)

Contractor’s Certification of Payment Form (attached as **Exhibit I**)

Final Receipt Form (attached as **Exhibit J**)

Technical Specifications (incorporated herein by reference as **Exhibit K**)

Contract Drawings (incorporated herein by reference as **Exhibit L**)

Equipment Rental Rates (to be later attached as **Exhibit M**)

Billing Rates for Salaried Personnel (attached as **Exhibit M**)

GMP Proposal (attached as **Exhibit M**)

Self-Performed Work Proposal (attached as **Exhibit N/A**)

Certificate of Insurance (attached as **Exhibit N**)

2.2 If anything in the Contract Documents is inconsistent with this Construction Contract, this Construction Contract will govern. The order of precedence of the Contract Documents shall be as follows:

2.2.1 this Construction Contract, as may be modified by amendment or change orders;

2.2.2 the General Contract Conditions;

2.2.3 the Basis of the GMP Work Proposal,

2.2.4 the Technical Specifications;

2.2.5 the Contract Drawings; and

2.2.6 all other Exhibits, whether attached to this Construction Contract, incorporated by reference or later added by Change Order.

2.3 The intent of the Contract Documents is to include all terms, conditions, work items and services necessary or required for the proper execution and completion of the Work. The Contract Documents are complementary, and what is required by any one shall be binding as if required by all. Work items or services not covered in the Contract Documents will be required unless they are not consistent with the Contract Documents and are not inferable from the Contract Documents as being necessary to produce the result intended by the Contract Documents. Anything mentioned in the Technical Specifications and not shown on the Contract Drawings or shown on the Contract Drawings and not mentioned in the Technical Specifications, shall be of like effect as if shown or mentioned in both. Words and abbreviations that have well known technical or trade meanings are used in the Contract Documents in accordance with such recognized meaning.

2.4 It is contemplated by the parties that numerous exhibits or attachments, including construction documents and final technical specifications, will not be accomplished or must be developed after execution of this Construction Contract and, as such, must be

finalized, incorporated by reference and/or attached to and be made a part of the Contract Documents subsequent to execution of this Construction Contract. The incorporation of such exhibits or attachments into this Construction Contract shall be accomplished by written directive from the Executive Director of Public Works or the Executive Director's designee. The parties shall be diligent in accomplishing these exhibits and attachments. To the extent these new exhibits or attachments conflict with other exhibits or portions of this Construction Contract, the greater service, better quality or greater quantity shall be included in the Work. However, nothing contained in this section shall limit the Contractor's ability to seek Change Order time and compensation adjustments for City changes to the Work incorporated into any of these later exhibits and attachments.

2.5 Where reference is made in this Construction Contract to a provision of the General Conditions or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

3.0 SCOPE OF WORK:

3.1 Completion Obligation. The Contractor shall execute the Project described in the Contract Documents, except to the extent specifically indicated in the Contract Documents as the responsibility of others. The Contractor agrees to commence and undertake the performance of the Work under this Construction Contract within ten (10) days of the date of issuance of a Notice to Proceed in substantially the form attached as **Exhibit H** and agrees to substantially complete said Work within the Contract Time and fully complete said Work in accordance with the Contract Documents. The Contractor may complete the Project earlier than the date for substantial completion established by the Contract Time, but any claim by the Contractor based on delay shall be based upon the date for substantial completion established by the Contract Time and not on an earlier projected completion date that the Contractor may propose.

3.2 Scope of Work. The entire Scope of Work shall include the following:

3.2.1 Construction Services. The Construction Phase Services shall include the furnishing of all construction administration, management, supervision and coordination experience and expertise, as well as all construction services, work effort, labor, tools, supplies, manufactured components, equipment, materials, and everything else necessary and required to complete the construction of the Project on time and within budget; while satisfying the City's longstanding commitment to quality, efficiency, value, innovation, partnering, responsiveness to agency and community needs and compliance with all applicable regulatory requirements in the performance of general public improvements. Compensation for the Construction Phase Services shall be in accordance with the terms and conditions of this Construction Contract.

3.2.1.1 GMP Scope of Work. The Contractor shall perform all Construction Services, as set forth in the GMP Proposal, which is attached as **Exhibit M**.

3.2.2 The Work. The terms “Scope of Work” or “Work” as used herein shall mean all Construction Services required by or reasonably inferable from the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor’s obligations. The Work shall constitute the whole of the Project.

3.3 Acknowledgement of Scope of Work. The Contractor expressly recognizes and acknowledges that this Project must be completed within the time and fiscal constraints as set forth throughout this Construction Contract.

3.3.1 The Contractor further represents to the City that by executing this Construction Contract, it has been fully informed of and has thoroughly reviewed the following: the objectives of the Project; the work effort of the Design Consultant performed to date for the Project; all of the Contract Documents attached to this Construction Contract or incorporated by reference; the City’s general time and budget constraints and contingencies applicable to the Budget; and all of the Work required by the Contractor by the Contract Documents. Based upon this thorough review and analysis and recognizing that the contract for design services is between the City and the Designer, the Contractor nonetheless represents to the City that it will provide or perform all of the necessary Work within the requirements of the Contract Documents.

3.3.2 Also by execution of this Construction Contract, the Contractor covenants and represents that the Contractor has visited the site of the Project (the “Site”) and has had sufficient time and opportunity to independently examine and is sufficiently familiar with: the Site, the character and nature of the Site layout and materials, the character and nature of all Site constraints, restrictions and limitations, and limitations on ingress, egress and construction staging and performance; and the local conditions under which the Work is to be performed, including weather conditions and any other factors which may impact the Work. The Contractor further represents that it has taken into consideration and correlated these direct observations, examinations and investigations with the requirements of the Contract Documents and in the pricing of the Work, the formulation of the GMP, the Contractor’s Fee and in preparing all Exhibits.

3.3.3 Also by execution of this Construction Contract, the Contractor represents that it has reviewed and is familiar with the City’s general expectations and scheduling assumptions regarding the completion of the Project and opening of the completed facility and that, given the Scope of Work, these scheduling assumptions are reasonable and achievable. The Contractor further represents that it will take into consideration and correlate these assumptions and constraints with the requirements of the Contract Documents and in the pricing of the Work, the GMP and the Contractor’s Fee.

3.3.4 Finally, the Contractor represents that it has reviewed the Design Consultant Agreements and the 100% Design Drawings, accepts the terms and

requirements thereof and affirmatively states that the Project, as expressed by the design documents and the Project requirements and constraints as modified by value engineering suggestions, budget adjustments and cost cutting measures suggested by the Contractor as of March 8, 2018 is a reasonable and constructible Project, incorporating a reasonable and workable delivery approach, schedule and budget.

4.0 RELATIONSHIP OF THE PARTIES:

4.1 The parties intend herein to establish a relationship wherein the City relies upon the integrity and fidelity of the Contractor to complete the Project within the time and budget constraints set forth in this Construction Contract and in a manner which satisfies the City's longstanding commitment to quality, efficiency, value, innovation, partnering, responsiveness to agency and community needs and compliance with all applicable regulatory requirements in the performance of general public improvements.

4.2 The Contractor accepts the relationship of trust and confidence established by this Construction Contract with the City. The Contractor further agrees to utilize the Contractor's best skills, efforts, and judgment in furthering the interests of the City regarding the Project; to furnish at all times an adequate supply of qualified and competent workers and quality materials; and to perform the work in the best, most expeditious, and economical manner. Further, the Contractor agrees to furnish efficient business administration, construction management and superintendence and to use its best efforts to complete the Work in an expeditious and economical manner, consistent with the interests of the City.

4.3 The City will have a separate agreement with the Design Consultant to design the Project and to provide construction contract administration services necessary to ensure that the Work conforms to the Contract Drawings and Technical Specifications. Both the Contractor and the Design Consultant shall be given direction by the City, or the City's designated and authorized representative(s). The Contract Documents shall not be deemed to create any contractual relationship between the Design Consultant and the Contractor or any separate contractors, subcontractors of any tier or suppliers on the Project. The relationship between the Contractor and the Design Consultant is intended to be cooperative and proactive, with both participating on the same team with the City.

4.4 The Contractor shall accept the designated and authorized representatives of the City identified in the Contract Documents and perform its obligations toward and in response to such representatives in the same manner it would toward and in response to the City, pursuant to such designation and authorization.

4.5 City Delegation of Authority. With reference to G.C. 212, CITY'S CONTRACT ADMINISTRATION LINE OF AUTHORITY, the Executive Director delegates to the City Engineer the authority necessary to undertake the responsibilities identified as the responsibilities of the Deputy Executive Director under this Construction Contract. The City Engineer hereby designates as Project Manager with authority to

handle the day to day administration of this Construction Contract, the following personnel:

Department of Public Works

Project Manager

Chelsea Hahn

Telephone

720-865-3189

5.0 COORDINATION AND COOPERATION:

5.1 The Contractor agrees to cooperate and coordinate fully with the City in its performance of the Work to meet or exceed the City's time and budgetary objectives and limitations, while maintaining the City's longstanding commitment to quality, efficiency, value, innovation, partnering, responsiveness to agency and community needs and compliance with all applicable regulatory requirements in the construction of general public improvements.

5.2 The Contractor shall, as a continuing work item under this Construction Contract, facilitate coordination, communication and cooperation regarding its performance hereunder between the City's Department of Public Works ("Public Works"), the Project Manager, the Design Consultant, the User Agency, other City consultants and any affiliated entities. In addition, the Contractor shall coordinate its efforts under this Construction Contract with all involved governmental and regulatory entities.

5.3 The Contractor shall be responsible for taking accurate and comprehensive minutes at all Construction meetings attended by the Contractor regarding the Project. Those minutes shall be prepared in a format approved by the Project Manager and issued to all attendees, as well as those other parties designated by the City, no later than three working days after the meeting. Unless approved in advance in writing by the Project Manager and to the greatest extent practicable, Project meetings with the City shall be conducted in the City and County of Denver, Colorado.

5.4 Nothing contained in the Contract Documents shall be deemed to give any third party any claim or right of action against the City, the Design Consultant or the Contractor that does not otherwise exist without regard to the Contract Documents.

5.5 The Contractor shall use its best efforts and take all necessary precautions to protect and prevent damage and/or disruption to all City facilities and equipment, and shall coordinate all ingress and egress requirements with appropriate persons and agencies.

6.0 CONTRACT TIME, SUBSTANTIAL COMPLETION AND LIQUIDATED DAMAGES:

6.1 Substantial Completion. The term "Substantial Completion" is defined in the General Conditions. The number of days the Contractor shall have to attain Substantial

Completion of the Scope of the Work set forth in the Contract Documents is set forth in this Section.

6.2 Construction Time. The term “Construction Time” is defined as the total number of days between the date of the Notice to Proceed with Construction and the date on which Substantial Completion of all Work must be completed by the Contractor. The Construction Time shall be: **NTP + 260 Calendar Days.**

6.3 Final Completion. Final Completion of the Work occurs following Substantial Completion when all punch list items are completed and the Contractor has provided the City with a Final Lien release Form (which may be contingent upon receipt of Final Payment) (in the form of **Exhibit G**). The term “Final Completion” is defined in the General Conditions.

6.4 Liquidated Damages. The parties recognize and agree that time is of the essence of this Contract. In the event that the Work is not Substantially Complete within the Construction Time, as that time may be extended for delays for which an extension of time is permitted under the terms of the Contract Documents, the City and the Contractor acknowledge and agree, after a full discussion of the implications of this section, that it would be impractical and extremely difficult to estimate the damages (including, by way of example but without limitation, direct and indirect, incidental, special and consequential damages) which the City might incur for failure of the Contractor to timely achieve Substantial Completion within either the Construction Time. Therefore, the City and the Contractor have determined that a reasonable estimate of the total detriment that the City would suffer in the event that the Contractor so defaults and the Project is not Substantially Complete within the Construction Time, as extended as permitted herein, is and shall be, in the event of said default and failure, as the sole and exclusive remedy (whether at law or in equity) of the City for this delay, and not as a penalty, the amount per day stated below that the Work shall remain not Substantially Complete after the Construction Time, as applicable, including extensions, has elapsed. . Due to the time sensitivities, the Contract establishes multiple milestones based on the date the Notice to Proceed is issued by the City. Milestone completion shall be achieved per the Milestone Schedule listed herein. If Substantial Completion is not reached by the last day of the individual milestone work window, liquidated damages will be assessed by the City to the contractor in the amount of \$500.00 per calendar day. Completion for the purposes of this section shall include all work completed per the Contract and any executed change orders and any executed amendments. It is understood and agreed that the City reserves all of its other rights and remedies for any other or different breach or default of this Construction Contract by Contractor, or for any other cause of action.

Milestone Schedule

<u>Milestone</u>	<u>Milestone Work Window</u>
#1	NTP to December 31, 2019
Receipt and installation of First Shipment of terracotta from supplier	

The parties agree that the foregoing amounts shall be the full amount of liquidated damages recoverable against the Contractor by the City for the Contractor's breach of its covenants of timely performance hereunder. The amount so determined shall be the full, agreed upon and liquidated damages recoverable against the Contractor by the City for the Contractor's breach of its covenants of timely performance hereunder. The provisions of this Section shall not limit the rights and remedies of the City pursuant to the General Conditions.

7.0 SUBCONTRACTS AND OTHER AGREEMENTS:

7.1 Subcontractor Selection. The Contractor recognizes and accepts that the subcontractor and supplier selection and contracting procedures specified herein are intended to promote pricing or buyout of the Work which is fair and reasonable and, to the greatest extent practicable, is based on fair and open competition. As such, all Work, except for Work or Services included in the Contractor's Fee, the Contractor's General Conditions or Work performed by the Contractor with the prior written approval of the Project Manager ("Self-Performed Work") shall be procured based upon competitive bids awarded to the lowest, responsive and qualified bidder and subcontracted to "Subcontractors" and "Suppliers," which may include Contractor Self-Performed Work under Section 7.1, in accordance with **Exhibit N/A** and in compliance with the General Conditions, attached hereto and incorporated herein as **Exhibit A**. Each Subcontractor and Supplier selection shall be reviewed by the City and the City reserves the right to reject any Subcontractor or Supplier in accordance with the terms and conditions of the General Conditions or in the event the City determines that the selection was not made after a competitive bid. Upon request of the Contractor, the City may waive the competitive bid requirement of this Section with the express written approval of the Project Manager.

7.2 Self-Performed Work.

7.2.1 Upon prior written approval of the Project Manager, the Contractor may compete for designated Subcontractor or Supplier Work packages. Should the Contractor submit a proposal for any such package, such proposal shall be submitted directly to the Project Manager prior to any proposal deadline and all bid or selection requirements specified in **Exhibit N/A** shall apply to proposal or bid opening and evaluation. The Project Manager shall review with the Contractor all bids submitted where the Contractor has submitted a bid and shall make the final award after consultation with the Contractor. The City must approve any Self-Performed Work award to the Contractor. The Contractor shall perform for the Contractor's lump sum bid amount on the basis of a Stipulated Lump Sum Subcontract, which shall also be subject to City review and written approval of the Project Manager prior to commencement of any Self-Performed Work but shall not be subject to the cost of work limitations of the Contract Documents.

7.2.2 No Self Performed Work is currently anticipated for this project.

7.3 Subcontract Forms. All subcontracts will be between the Contractor and the selected Subcontractors or Suppliers, which may include the Contractor for Lump Sum Self-Performed Work. The form of each subcontract shall be furnished to the City for review and acceptance as to form, which acceptance shall not be unreasonably withheld. All subcontracts shall require that all Subcontractors or Suppliers of any tier performing Work accept and agree to be bound by the terms and conditions of the Contract Documents and to assume toward the Contractor all obligations and responsibilities the Contractor, by the Contract Documents, assumes toward the City. All subcontracts shall preserve and protect the rights of the City under the Contract Documents with respect to the Work to be performed by the Subcontractor so that the subcontracting thereof shall not prejudice these rights.

7.4 Substitution. The Contractor shall make no substitution for a Subcontractor or Supplier previously selected without the prior written approval of the Project Manager and such approval shall not be unreasonable withheld.

7.5 Responsibility. The Contractor shall be responsible to the City for the acts and omissions of its agents and employees, Subcontractors and Suppliers of any tier, and their agents and employees performing Work under this Construction Contract.

8.0 COMPENSATION.

8.1 Cost of the Work. The term Cost of the Work shall consist of costs necessarily incurred in the proper performance of the Work for the Project as delineated below which shall be paid by the City to the Contractor. Cost of the Work shall not include any Fee of the Contractor. Any allowable mark-up by the Contractor is included in the Contractor's Fee. Cost of the Work shall consist of the following Contractor incurred items set forth below:

8.1.1 Cost of wages paid for labor in the performance of the Work at the site or with the City's agreement at offsite workshops, which shall as a minimum be in accordance with the prevailing wage rates established by the City and County of Denver for construction projects, as set out in DRMC Section 20-76, and in effect at the time that the GMP is established. In the event the prevailing wage rates are increased in accordance with DRMC Section 20-76, on the anniversary date of this Construction Contract, these increases shall also be included as a cost of the work. Costs paid or incurred by the Contractor shall include actual wages for the Contractor's own personnel (including overtime premiums as applicable), taxes, insurance, contributions, assessments and benefits required by law or collective bargaining agreements and for personnel not covered by such agreements, customary benefits and the Contractor's company policy such as sick leave, individual and dependent medical and health benefits, disability insurance, holidays, craft training fund, vacation, pension, and, as applicable, 401K contributions. The City and the Contractor agree that the wages and burden for the personnel referenced in this paragraph and paragraphs 8.1.17 and 8.1.18 shall be charged as a Cost of the Work at not less than the stipulated fixed rates set forth on Prevailing Wage Rate Schedule, attached as **Exhibit E**, or as appropriate

charges at the stipulated fixed rates set forth on the Billing Rates for Salaried Personnel attached as **Exhibit M**.

8.1.2 Cost of contributions, assessments or taxes for such items as unemployment compensation and social security, insofar as such cost is based on wages, salaries or other remuneration paid pursuant to Section 8.1.1.

8.1.3 Cost of mock-ups and testing, as may be previously approved by the Project Manager.

8.1.4 Cost of all materials, supplies and equipment incorporated in the Work, including costs of transportation thereof.

8.1.5 Payments properly made by the Contractor to Subcontractors and Suppliers under Project subcontracts for performance of portions of the Work including insurance required by this Contract and bond premiums incurred.

8.1.6 Payments actually made for architects, engineers and other consultants providing services to the Contractor reasonably required to perform the work, unless such services are to be provided to the Owner by the Design Consultant or other City-Retained Consultants (as defined in the Design Consultant's Agreement for Professional Design Services).

8.1.7 Cost, including transportation, inspection, handling, storage and maintenance, of all temporary facilities and all materials, supplies, equipment and hand tools not owned by the workmen that are consumed in the performance of the Work on the Project. The Contractor shall negotiate with the City the salvage value of all items purchased and used on the Project but not consumed, damaged, lost or stolen at the completion of the work, crediting any proceeds against the Cost of the Work. If the Contractor and the City cannot agree on the salvage value of the above items then said items shall remain the property of the City and the Contractor shall give no credit to the Cost of the Work. The Contractor may institute a voluntary recycling program.

8.1.8 Actual rental charges of all necessary machinery and equipment, exclusive of hand tools, used at the Site, whether rented from the Contractor (at rental rates approved by City and specified on **Exhibit M**) or others, including equipment owned by the Contractor that is assigned to salaried staff and charged to the Project and costs of fuel, oil, insurance, maintenance and minor repairs and replacements, transportation, installation, dismantling and removal thereof. The City and the Contractor agree that the rates for the rented equipment shall be charged as a Cost of Work at the stipulated fixed rates set forth on the Equipment Rental Rate Schedule, attached as **Exhibit M**.

8.1.9 The cost of the premiums for all bonds and Builder's Risk insurance that the Contractor is required to procure by this Construction Contract. The costs of the premiums for all other insurance that the Contractor is required to procure by this Construction Contract or that are deemed necessary by the Contractor with

the City's written approval shall be charged as a Cost of the Work at the stipulated fixed percentage of 1.28% of the Cost of Work, and all deductibles that are attributable to this Construction Contract, including equipment insurance deductibles.

8.1.10 Applicable sales, use or similar taxes related to the direct performance of the Work and for which the Contractor is liable, imposed by any governmental authority.

8.1.11 Permits, fees, licenses, costs of all tests, commissioning costs, inspections and approvals, as may be required by the Contract Documents or applicable laws, ordinances or public authority for the performance of the work (except for inspection and testing performed by the City, at its cost).

8.1.12 Actual costs of reproduction, telegrams, facsimile transmissions, mobile phones, long distance telephone calls, telephone service at the Site, postage and express delivery charges, and reasonable petty cash expenses of the site office in connection with the Work.

8.1.13 Cost of removal of all debris from the Site.

8.1.14 Costs for temporary and permanent power, lighting, heat, chilled drinking water, sewer and water services as required to complete the Work at the Site, and costs for snow removal as required.

8.1.15 Cost incurred by the Contractor in repairing or correcting defective, damaged or nonconforming work, provided that such defective, damaged or nonconforming work was beyond the control of the Contractor, Subcontractors, or Suppliers, or caused by the ordinary mistakes or inadvertence, and not the negligence of the Contractor's or any Subcontractor's or Supplier's supervisory personnel. If the costs associated with such defective, damaged or nonconforming work are recoverable from insurance or Subcontractors or Suppliers, the Contractor shall exercise its best efforts to obtain recovery from the appropriate source and credit the Cost of the Work if recovery is obtained.

8.1.16 Costs incurred due to any emergency affecting the safety of persons and property and related to the Work unless otherwise covered by insurance or reimbursable from a Subcontractor or Supplier, or unless such costs are due to the fault or negligence of the Contractor or a Subcontractor or Supplier of any tier.

8.1.17 Wages or salaries of the Contractor's supervisory and administrative personnel when stationed at the site, and when stationed off-site and working on the Project in accordance with the staffing and salary schedule set forth in **Exhibit M**, including vacation time, in accordance with the Contractor's company policy, accrued and taken during the performance of the Work. This includes estimators, safety personnel, quality control personnel and their assistants.

8.1.18 Wages or salaries of the Contractor's supervisory or administrative personnel engaged at factories, workshops or on the road, in expediting the production or transportation of materials or equipment required for the Work, but only for that portion of their time required for the Work in accordance with the staffing and salary schedule set forth in **Exhibit M**.

8.1.19 With prior written approval of the Project Manager, that portion of the reasonable travel and subsistence expenses of the Contractor's personnel incurred while traveling in discharge of duties connected with the Work.

8.1.20 Fees of testing laboratories for tests required by the Contract Documents.

8.1.21 Legal, mediation and arbitration costs other than those arising from disputes between the City and the Contractor reasonably incurred by the Contractor in the performance of the Work and with the City's prior written permission of the Project Manager.

8.1.22 Other costs incurred in the performance of the Work if and to the extent approved in advance in writing by the City.

8.1.23 Costs associated with the implementation of any established company safety program, which costs shall be subject to City's reasonable approval.

8.1.24 Contractor's General Conditions expenses as identified in **Exhibit A**. These expenses include rented or purchased materials and equipment used by the Contractor at the Project site office in connection with the Work.

8.1.25 Cost of warranty repairs, to the extent not covered by a subcontract or purchase agreement (provided that the Contractor shall use its best efforts to enforce the warranties received from subcontractors, suppliers and vendors). These costs include the Contractor's administrative staff associated with supervision and management of the warranty repairs.

8.1.26 Reasonable data processing costs related to the work, including data line service, internet charges, software costs and licenses fees.

8.1.27 Deposits for materials, design of manufactured items and supplied items is the responsibility of the contractor. Reimbursements will be made once the item is installed and accepted by the Project Manager.

8.2 **Costs Not To Be Reimbursed.** Cost of the Work shall not include expenditures made for any of the following:

8.2.1 Salary of any officer of the Contractor.

8.2.2 Salary of the Contractor's employees stationed at the Contractor's main office not working on the Project.

8.2.3 Overhead, profit and general expenses of any kind except as included in the Contractor's Fee.

8.2.4 The capital expenses of the Contractor, including interest on capital employed for the work.

8.2.5 Expenses of the Contractor's principal office and offices, other than the Site office.

8.2.6 Costs incurred by the Contractor in situations where such costs may be covered by insurance or recoverable from a Subcontractor or Supplier, if the Contractor failed to use its best efforts to obtain such insurance proceeds or recovery from the responsible Subcontractor(s) or Supplier(s).

8.2.7 Expenses incurred for relocation and temporary living expenses of personnel required for the Work, or when such relocation is for the convenience of the Contractor.

8.2.8 Any cost that would cause the GMP to be exceeded.

8.2.9 Any costs not specifically included in the Cost of the Work, Section 8.1.

8.2.10 Costs of retesting non-conforming Work.

8.3 **Contractor's Fee.** The "Contractor's Fee" (the "Fee") to be paid to the Contractor and included in the GMP shall be a lump sum of **SEVENTY-ONE THOUSAND FIVE HUNDRED FIFTY-FOUR DOLLARS AND FIFTEEN CENTS (\$71,554.15)**, payable in progress installments pursuant to a mutually agreeable schedule of progress installments.

8.4 **Guaranteed Maximum Price.**

8.4.1 **Guaranteed Maximum Price.** The GMP shall be established at the time the GMP proposal is accepted by the City and incorporated herein as **Exhibit M**, subject to adjustments as provided in the Contract Documents.

8.4.2 The Guaranteed Maximum Price consists of the sum of (i) the estimated Cost of the Work; and (ii) the Fee. The Contractor has presented and the City has accepted the Guaranteed Maximum Price and Basis of the GMP Proposal attached hereto as **Exhibit M**. The Parties specifically agree that the City shall not be subject to any cost, charge or fee under this Agreement that is not specified above.

8.5 Savings. In the event that the actual Cost of the Work plus the Fee shall be less than the GMP, the resulting savings shall inure One Hundred Percent (100%) to the City. The Contractor shall distribute such savings to the City by Change Order that either reduces the GMP or implements enhancements or additions to the Project requested by the City.

8.6 Construction Contract Amount and Funding. In accordance with the terms of this Construction Contract, the maximum Construction Contract Amount to be paid by the City to the Contractor under this Agreement shall not exceed **ONE MILLION NINE HUNDRED SEVEN THOUSAND THREE HUNDRED TWENTY-FIVE DOLLARS AND FORTY-FOUR CENTS (\$1,907,325.44)**. The Contractor guarantees and warrants that the Project will be completed by its performance hereunder for the GMP amount. In no event will the City's liability exceed the maximum Construction Contract Amount, as adjusted by duly authorized change order in accordance with this Construction Contract. The parties specifically agree that any performance by the Contractor hereunder shall not subject the City to any cost, charge or fee not specified above.

9.0 DISPUTE RESOLUTION:

It is the express intention of the parties to this Construction Contract that all disputes of any nature whatsoever regarding the Construction Contract including, but not limited to, any claims for compensation or damages arising out of breach or default under this Construction Contract, shall be resolved by administrative hearing pursuant to the provisions of Section 56-106, DRMC or, with respect to appropriate issues involving Small Business Enterprise contracting, by Section 28-33, DRMC. The Contractor expressly agrees that this dispute resolution process is the sole and only dispute resolution mechanism that will be recognized and employed by the parties for any claims put forward by the Contractor, notwithstanding any other claimed theory of entitlement on the part of the Contractor or its Subcontractors or Suppliers.

10.0 ADDITIONAL PROVISIONS:

10.1 No Discrimination in Employment. In connection with the performance of the Work under this Construction Contract, the Contractor agrees not to refuse to hire, discharge, promote or demote, or to discriminate in matters of compensation against any person otherwise qualified, solely because of race, color, religion, national origin, gender, age, military status, sexual orientation, gender identity or gender expression, marital status, or physical or mental disability; and the Contractor further agrees to insert the foregoing provision in all subcontracts hereunder. Further, the Contractor agrees to comply with the provisions of Section 28-45 to 28-47, DRMC, and all Rules and Regulations promulgated and adopted by the Executive Director of Public Works pursuant thereto relating to non-discrimination in employment by contractors, subcontractors and suppliers receiving compensation for work performed on the Project.

10.2 Insurance. In addition to the requirements and obligations set forth in Title 16, the Contractor shall comply with the insurance requirements as set forth in **SC-28**.

10.3 Title to the Work. The parties agree that the City shall have title to all components and aspects of the Project which are in place and title to all materials for which any payment has been made to the Contractor hereunder.

10.4 Compliance with Minority/Women Owned Business Enterprise Requirements. This Construction Contract is subject to all applicable provisions of Divisions 1 and 3 of Article III, of Chapter 28, Denver Revised Municipal Code (D.R.M.C.), designated as Sections 28-31 – 29-36 and 28-52 – 28-90 D.R.M.C. and referred to in this Contract as the “M/WBE Ordinance”. In accordance with the requirements of the M/WBE Ordinance, the Contractor is committed to, at a minimum, meet the participation goal of **7%** established for this Project utilizing properly certified M/WBE subcontractors and suppliers. In addition to the applicable provisions of the M/WBE Ordinance, the Contractor agrees, as an express condition of its performance hereunder, to comply with the requirements of any approved Small Business Enterprise Compliance Plan (attached and incorporated herein as **Exhibit C**). Such plan shall, at a minimum, include a narrative regarding compliance with the goal; a list of committed M/WBE participants along with dollar and percent participation for each evidencing compliance with the overall goal, and fully executed letters of intent for each listed participant, all in a form satisfactory to the City. Without limiting the general applicability of the foregoing, the Contractor acknowledges its continuing duty, pursuant to Sections 28-72, 28-73 and 28-75 DRMC and the M/WBE Program, to meet and maintain throughout the duration of this Construction Contract its participation and compliance commitments and to ensure that all Subcontractors subject to the M/WBE Ordinance or the M/WBE Program also maintain such commitments and compliance. Failure to comply with these requirements may result, at the discretion of the Director of the Division of Small Business Opportunity (“DSBO”), in the imposition of sanctions against the Contractor in accordance with Section 28-77, DRMC. Nothing contained in this Paragraph or in the referenced City ordinance shall negate the City’s right to prior approval of Subcontractors, or substitutes therefore, under this Construction Contract.

10.5 Compliance with Prevailing Wage Rate Requirements.

10.5.1 Contractor shall comply with, and agrees to be bound by, all requirements, conditions and City determinations regarding the Payment of Prevailing Wages Ordinance, Sections 20-76 through 20-79, D.R.M.C. including, but not limited to, the requirement that every covered worker working on a City owned or leased building or on City-owned land shall be paid no less than the prevailing wages and fringe benefits in effect on the date the bid or request for proposal was advertised. In the event a request for bids, or a request for proposal, was not advertised, Contractor shall pay every covered worker no less than the prevailing wages and fringe benefits in effect on the date funds for the contract were encumbered. A copy of the applicable prevailing wage rate schedule is attached as **Exhibit E** and incorporated herein by reference.

Date bid or request for qualifications/proposals was advertised May 9, 2018.

10.5.2 Prevailing wage and fringe rates will adjust on, and only on, the anniversary of the date the Contract was fully executed. Unless expressly provided for in this Agreement, Contractor will receive no additional compensation for increases in prevailing wages or fringe benefits.

10.5.3 Contractor shall provide the Auditor with a list of all subcontractors providing any services under the contract.

10.5.4 Contractor shall provide the Auditor with electronically-certified payroll records for all covered workers employed under the contract.

10.5.5 Contractor shall prominently post at the work site the current prevailing wage and fringe benefit rates. The posting must inform workers that any complaints regarding the payment of prevailing wages or fringe benefits may be submitted to the Denver Auditor by calling 720-913-5000 or emailing auditor@denvergov.org.

10.5.6 If Contractor fails to pay workers as required by the Prevailing Wage Ordinance, Contractor will not be paid until documentation of payment satisfactory to the Auditor has been provided. The City may, by written notice, suspend or terminate work if Contractor fails to pay required wages and fringe benefits.

10.6 Applicability of Laws. This Contract and Agreement between the Contractor and the City shall be deemed to have been made in the City and County of Denver, State of Colorado and shall be subject to, governed by and interpreted and construed in accordance with the laws of the State of Colorado and the Charter, the Revised Municipal Code, Rules, Regulations, Executive Orders and fiscal rules of the City. As such, the Contractor shall at all times comply with the provisions of the Charter, Revised Municipal Code, Rules, Regulations, Executive Orders and fiscal rules of the City, and those of the State of Colorado and Federal Laws and Rules and Regulations, which in any manner limit, control or apply to the actions or operations of the Contractor, any Subcontractors, employees, agents or servants of the Contractor engaged in the Work or affecting the materials and equipment used in the performance of the Work, as the same may be, from time to time, promulgated, revised or amended. The Charter and Revised Municipal Code of the City, as the same may be amended from time to time, are hereby expressly incorporated into this Construction Contract as if fully set out herein by this reference.

10.7 Appropriation. Notwithstanding any other term, provision, or condition herein, all payment obligations under this Construction Contract shall be limited to the funds appropriated or otherwise made available by the Denver City Council and paid into the Treasury of the City. As of the date of this Construction Contract, **ONE MILLION NINE HUNDRED SEVEN THOUSAND THREE HUNDRED TWENTY-FIVE DOLLARS AND FORTY-FOUR CENTS (\$1,907,325.44)** have been appropriated for this Construction Contract. The Executive Director of Public Works, upon reasonable

written request, will advise the Contractor in writing of the total amount of appropriated and encumbered funds that are or remain available for payment to the Contractor.

10.7.1 The issuance of any form of order or directive by the City which would cause the aggregate amount payable to the Contractor to exceed the amount appropriated for the Work to be performed in accordance with the Contract Documents is expressly prohibited. In no event shall the issuance of any change order or other form of order or directive by the City be considered valid or binding if it requires additional compensable Work to be performed, which Work will cause the aggregate amount payable for such Work to exceed the amount appropriated and encumbered for the Work, unless and until such time as the Contractor has been advised in writing by the Executive Director of Public Works that a lawful appropriation sufficient to cover the entire cost of such additional Work has been made. It shall be the responsibility of the Contractor to verify that the amounts already appropriated for the Work are sufficient to cover the entire cost of such Work, and any Work undertaken or performed in excess of the amount appropriated is undertaken or performed in violation of the terms of this Agreement, without the proper authorization for such Work, and at the Contractor's own risk and sole expense.

10.8 Approvals. In the event this contract calls for the payment by the City of **ONE MILLION NINE HUNDRED SEVEN THOUSAND THREE HUNDRED TWENTY-FIVE DOLLARS AND FORTY-FOUR CENTS (\$1,907,325.44)** or more, approval by the City Council of the City and County of Denver, acting by ordinance, in accordance with Section 3.2.6 of the Charter of the City and County of Denver, is and shall be an express condition precedent to the lawful and binding execution and effect and performance of this contract.

10.9 Assignment Strictly Prohibited. The Contractor shall not assign or otherwise transfer, in whole or in part, any of its rights, benefits, claims, obligations, duties or entitlement to monies owed or which may become due under this Construction Contract, except upon the prior written consent and approval of the Executive Director to such assignment.

10.10 Conflict of Interest. The parties agree that no official, officer or employee of the City shall have any personal or beneficial interest whatsoever in the services or property described herein and the City further agrees not to hire or contract for services with any official, officer or employee of the City or any other person which would be in violation of the Denver Revised Municipal Code Chapter 2, Article IV, Code of Ethics, or Denver City Charter provisions 1.2.9 and 1.2.12.

10.11 Taxes, Charges and Penalties. Except as provided in the City's Prompt Payment ordinance, codified at DRMC Sections 20-107, 20-108 and 20-109, the City shall not be liable for the payment of any taxes, late charges, interest or penalties of any nature arising out of this Construction Contract.

10.12 Waiver of C.R.S. 13-20-802 et. seq. The Contractor specifically waives all the provisions of Part 8 of Article 20 of Title 13, Colorado Revised Statutes regarding defects in the Work under this Construction Contract.

10.13 Proprietary or Confidential Information.

10.13.1 City Information: The Contractor understands and agrees that, in performance of this Construction Contract, the Contractor may have access to private or confidential information that may be owned or controlled by the City and that such information may contain proprietary or confidential details, the disclosure of which to third parties may be damaging to the City. The Contractor agrees that all information disclosed by the City to the Contractor shall be held in confidence and used only in performance of the Construction Contract. The Contractor shall exercise the same standard of care to protect such information as a reasonably prudent Contractor would to protect its own proprietary data.

10.13.2 Contractor Information: The parties understand that all the material provided or produced under this Construction Contract may be subject to the Colorado Open Records Act, C.R.S. 24-72-201, et seq., and that in the event of a request to the City for disclosure of such information, the City shall advise the Contractor of such request in order to give the Contractor the opportunity to object to the disclosure of any of its proprietary or confidential material. In the event of the filing of a lawsuit to compel such disclosure, the City will tender all such material to the court for judicial determination of the issue of disclosure and the Contractor agrees to intervene in such lawsuit to protect and assert its claims of privilege against disclosure of such material. The Contractor further agrees to defend, indemnify and save and hold harmless the City, its officers, agents and employees, from any claim, damages, expense, loss or costs arising out of the Contractor's intervention to protect and assert its claims of privilege against disclosure under this Section including, but not limited to, prompt reimbursement to the City of all reasonable attorney fees, costs and damages that the City may incur directly or may be ordered to pay by such court.

10.14 Status of Contractor. It is understood and agreed that the status of the Contractor shall be that of an independent contractor retained on a contractual basis to perform work or services for limited periods of time, and it is not intended, nor shall it be construed, that the Contractor, or any member of its staff or any consultant, is an employee or officer of the City for any purpose whatsoever.

10.15 Rights and Remedies Not Waived. No payment or failure to act under the Construction Contract by the City shall constitute a waiver of any breach of covenant or default which may then exist on the part of the Contractor. No assent, expressed or implied, by either party to any breach of the Construction Contract shall be held to be a waiver of any default or other breach.

10.16 Notices. Any notices, demands, or other communications required or permitted to be given by any provision of this Construction Contract shall be given in writing,

delivered personally or sent by registered mail, postage prepaid and return receipt requested, addressed to the parties at the addresses set forth herein or at such other address as either party may hereafter or from time to time designate by written notice to the other party given in accordance herewith. Notice shall be considered received on the day on which such notice is actually received by the party to whom it is addressed, or the third (3rd) day after such notice is mailed, whichever is earlier. Unless changed in writing, such notices shall be mailed to:

If to the Contractor:

Spectrum General Contractors, Inc.
5135 East 38th Avenue
Denver, Colorado 80207

If to the City
Executive Director of Public Works
Department of Public Works
City and County of Denver
201 West Colfax, Department 608
Denver, Colorado 80202

With a copy to:
City Attorney
City and County of Denver
201 West Colfax, Department 1207
Denver, Colorado 80202

10.17 Survival of Certain Provisions. The parties understand and agree that all terms, conditions and covenants of this Construction Contract, together with the exhibits and attachments hereto, if any, any or all of which, by reasonable implication, contemplate continued performance or compliance beyond the expiration or termination of this Construction Contract (by expiration of the term or otherwise), shall survive such expiration or termination and shall continue to be enforceable as provided herein. Without limiting the generality of the foregoing, the Contractor's obligations for the provision of insurance, for indemnity to the City and for preserving confidentiality of trade secrets and other information shall survive for a period equal to any and all relevant statutes of limitation, plus the time necessary to fully resolve any claims, matters, or actions begun within that period.

10.18 Contract Binding. It is agreed that this Construction Contract shall be binding on and inure to the benefit of the parties hereto, their heirs, executors, administrators, successors and duly authorized assigns.

10.19 Paragraph Headings. The captions and headings set forth herein are for convenience of reference only and shall not be construed so as to define or limit the terms and provisions hereof.

10.20 Severability. It is understood and agreed by the parties hereto that, if any part, term, or provision of this Construction Contract, except for the provisions of this Construction Contract requiring prior appropriation and limiting the total amount to be paid by the City, is by the courts held to be illegal or in conflict with any law of the State of Colorado, the validity of the remaining portions or provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Construction Contract did not contain the particular part, term or provision held to be invalid.

10.21 Electronic Signatures and Electronic Records. Contractor consents to the use of electronic signatures by the City. The Agreement, and any other documents requiring a signature hereunder, may be signed electronically by the City in the manner specified by the City. The Parties agree not to deny the legal effect or enforceability of the Agreement solely because it is in electronic form or because an electronic record was used in its formation. The Parties agree not to object to the admissibility of the Agreement in the form of an electronic record, or a paper copy of an electronic document, or a paper copy of a document bearing an electronic signature, on the ground that it is an electronic record or electronic signature or that it is not in its original form or is not an original.

Contract Control Number:

IN WITNESS WHEREOF, the parties have set their hands and affixed their seals at
Denver, Colorado as of

SEAL

CITY AND COUNTY OF DENVER

ATTEST:

By_____

APPROVED AS TO FORM:

REGISTERED AND COUNTERSIGNED:

By_____


By_____

By_____



Contract Control Number: PWADM-201946720-00

Contractor Name: SPECTRUM GENERAL CONTRACTORS, INC.

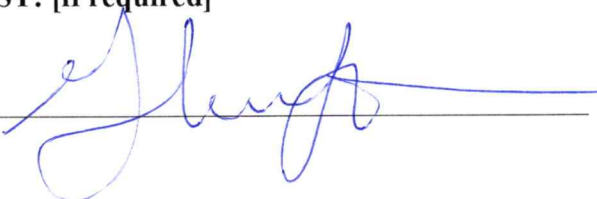
By: 

Name: Oluse Hottus
(please print)

Title: Vice President.
(please print)



ATTEST: [if required]

By: 

Name: Graham Johnson
(please print)

Title: Project Manager
(please print)



Exhibit A

General Contract Conditions 2011 Edition

CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC WORKS

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SPECIAL CONTRACT CONDITIONS

CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC WORKS

SC-1 CONSTRUCTION SPECIFICATIONS

Except as amended herein or in the attached Technical Specifications, all Work performed under the terms of this Contract shall be governed by the applicable provisions of the following latest editions:

Standard Specifications for Construction, GENERAL CONTRACT CONDITIONS, City and County of Denver (The Index for which is bound herein and commonly referred to as the "Yellow Book") (2011 Edition)

Colorado Department of Transportation "Standard Specifications for Road and Bridge Construction" (Sections 200 through 700 of the 2011 Edition).

Transportation Standards and Details for the Engineering Division, City and County of Denver (January, 2013)

Manual on Uniform Traffic Control Devices for Streets & Highways (MUTCD)

Building Code of the City and County of Denver

National Fire Protection Association Standards (As referenced in the Building Code of the City and County of Denver)

Wastewater Management Division – Detail and Technical Specifications for Storm and Sanitary Construction.

The aforementioned documents are available for review at the Capital Projects Management Office, 201 W. Colfax Ave., Dept. 506, (5th floor), Denver, CO 80202. *The Standard Specifications for Construction, GENERAL CONTRACT CONDITIONS, City and County of Denver*, and the *Standards and Details for the City and County of Denver* are available online at:

<http://www.denvergov.org/Portals/480/documents/2011%20DENVER%20GENERAL%20CONTRACT%20CONDITIONS.pdf>

<http://www.denvergov.org/rightofwayservices/RightofWayServices/ConstructionInspection/RightofWayConstructionInspection/StandardsandDetails/TransportationStandardsandDetails/tabid/442463/Default.aspx>

<http://www.denvergov.org/wastewatermanagement/WastewaterManagement/EngineeringandPermits/StandardsandDetails/tabid/438018/Default.aspx>

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The *Manual on Uniform Traffic Control Devices for Streets & Highways* is available for review as stated above, or can be viewed at the Federal Highway Administration Website at: www.fhwa.dot.gov, where you will also find purchase information.

The “*Colorado Department of Transportation Standard Specifications for Road and Bridge Construction*” is available for review as stated above, or can be purchased from the Colorado Department of Transportation.

The *Wastewater Management Division – Detail and Technical Specifications for Storm and Sanitary Construction*, is available at Wastewater Management Division, 2000 W. 3rd Avenue, Denver, CO 80223

SC-2 CITY DELEGATION OF AUTHORITY

With reference to General Contract Condition 109, DEPUTY MANAGER, General Contract Condition 206, ENGINEERING DIVISION and General Contract Condition 214, CITY’S CONTRACT ADMINISTRATION LINE OF AUTHORITY, the Manager hereby designates the City Engineer as the City official responsible for those certain actions and decisions designated as the responsibility of the Deputy Manager under the General Conditions and delegates to the City Engineer the authority necessary to undertake those responsibilities under this Contract. The Director shall have supervisory responsibility over the Project Manager. Additionally, Contractor questions concerning the Plans and Technical Specifications shall be directed to:

Denver Department of Public Works / Engineering Division,

Project Manager
Chelsea Hahn

Consultant
Anderson Hallas Architects

SC-3 CONTRACT AMOUNT; BID PRICE, GUARANTEED MAXIMUM PRICE

General Condition 103, CONTRACT AMOUNT, is hereby deleted in its entirety and replaced with the following:

“Contract Amount,” “Bid Price,” “Bid Amount,” or “Maximum Contract Amount” means the Guaranteed Maximum Price (“GMP”) under the Contract.

In the General Conditions, the phrases “provided to the City at no cost,” “at no cost to the City,” “cost . . . shall be borne by the Contractor,” “costs shall be reimbursed by the Contractor,” “at the expense of the Contractor,” “Contractor shall bear any and all costs,” and “Contractor shall bear any and all additional costs,” mean that the costs in question are to be included as a Cost of the Work without any increase to the Guaranteed Maximum Price. Also, whenever a General Condition states that the Contractor shall be required to take any action, or responsible for any action or thing, it means that such requirements and responsibilities are included as a Cost of the Work without any increase to the Guaranteed Maximum Price, unless there is a specific statement to the contrary as to any such requirement or responsibility.

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SC-4 TIME OF BIDDING; TIME OF CONTRACTING

In the General Conditions, the words "time of bidding," "bidding," and the like, shall mean the time when the Contract is signed.

SC-5 CONTRACT DOCUMENTS

General Condition 104 CONTRACT DOCUMENTS is hereby deleted in its entirety and replaced with the following:

"The Contract Documents" consist of the documents which are listed in the Contract Form."

SC-6 CONTRACT TIME

General Condition 105 CONTRACT TIME is hereby deleted in its entirety and replaced with the following:

"Contract Time" is the time specified in the Contract within which the Contractor is required to substantially complete the Work. Substantial Completion shall occur prior to Final Completion. The Contract Documents may require completion on or before a certain specified date.

SC-7 DEPUTY MANAGER/CITY ENGINEER

General condition 109 DEPUTY MANAGER is hereby deleted in its entirety and replaced with the following:

The "Deputy Manager" means the official who reports directly to the Manager and exercises supervisory responsibility in the City agency defined in Title 2 herein that is responsible for the Project. The Manager hereby designates the City Engineer as the Deputy Manager for purposes of this Contract. The City Engineer shall have responsibility for this Project and shall undertake all duties, responsibilities, rights and authority, including specific actions and decisions, delegated to the Deputy Manager under the various terms and conditions of this Contract.

SC-8 SUBCONTRACTOR

General Condition 118, SUBCONTRACTOR, is hereby amended by adding a new final sentence to read as follows:

"Subcontractor" may also mean the Contractor pursuant to a subcontract for lump-sum self-performed work, as authorized in the Contract Form.

SC-9 WORK

General Condition 121 WORK is hereby deleted in its entirety and replaced with the following:

The terms "Scope of Work" or "Work" as used herein shall mean all Preconstruction and Construction Phase services required by or inferable from the Contract Documents, whether completed or partially completed, and includes all other labor, management, administration, supervision, materials, supplies, manufactured components, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations under the Contract.

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SC-10 WORKING HOURS AND SCHEDULE

General Condition 306 WORKING HOURS AND SCHEDULE is hereby deleted in its entirety and replaced with the following:

1. Work shall normally not be done on Saturdays, Sundays, City observed holidays, or outside of the daytime working hours which may be specified in the Special Conditions, except for such work as may be necessary for proper care, maintenance, and protection of Work already done, or in cases when the Work would be endangered or when hazard to life or property would result. The Contractor shall comply with Denver's noise control ordinance during all working hours.
- 2.. If the Contractor believes it may be necessary to work on Saturdays, Sundays, holidays, city furlough days, or at night, the Contractor shall make prior arrangements with the Project Manager and receive written approval at least twenty-four (24) hours before such work period so that proper inspection and engineering services can be provided. Such approval may be revoked by the Project Manager if the Contractor fails to maintain adequate equipment and lighting at night for the proper prosecution, control and inspection of the Work. If Work is done outside of approved working hours, and the Project Manager has not assigned inspectors to the Work, the Work performed during those periods of time may be declared defective solely on the grounds that it was not properly inspected.
3. The Contractor shall schedule and coordinate the performance of all of its Subcontractors and Suppliers, including their use of the Work site. The Contractor shall keep the Subcontractors and Suppliers informed of the Project construction schedule to enable the Subcontractors and Suppliers to plan and perform their work properly.
4. The Contractor shall submit, with the GMP Proposal, a construction schedule which shall provide for the expeditious and practicable execution of the Work. Such construction schedule shall be in a Critical Path Method (CPM) format or such other format approved by the Project Manager. This Schedule shall be considered, upon City acceptance, the baseline schedule for the Project. A Critical Path Method schedule shall be required in any event for any Contractor Change Request pursuant to G.C. 1103.4 and any resulting claim. The receipt of the schedule by the Project Manager shall in no way constitute acceptance of the Contractor's anticipated schedule of construction activities. The schedule will be reviewed for comment by the Project Manager. The Project Manager's review and comment on the schedule shall not constitute approval or acceptance thereof by the City.
5. The Critical Path Method schedule shall provide reasonable detail as described in the Technical Specifications and shall include a time scaled network and computer printout. Additionally, float or slack is defined as the amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any activities in the schedule. Float or slack is not time for the exclusive use or benefit of either the Contractor or the City.

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6. The Contractor shall, once a month, submit a progress report and an updated schedule in a form acceptable to the Project Manager.

SC-11 SUBCONTRACTOR ACCEPTANCE

General Condition 502, SUBCONTRACTOR ACCEPTANCE, is hereby deleted in its entirety and replaced by the following:

1. Except as provided in the City's Small Business Enterprise (SBE), Disadvantaged Business Enterprise (DBE), or Minority and Women Business Enterprise (M/WBE) contracting requirements, the City recognizes that prior to bidding, the bidder may not have been able to negotiate for all portions of the Work which the bidder proposes to subcontract. The City will, therefore, permit the successful bidder to propose additional Subcontractor(s) at any time during the Contract period provided, however, that any limitation on subcontracting has not been exceeded, and that all such SBE, DBE, or M/WBE requirements are adhered to, including, if applicable, the Contractor's SBE or M/WBE Compliance Plan. If the proposed Subcontractor(s) are acceptable and the City, by letter to the Contractor, approves of the Subcontractor(s), the Contractor may enter into agreements with these parties. If any proposed Subcontractor(s) are not acceptable to the City, the Contractor must submit for City approval the names of substitute Subcontractors.
2. Each Subcontractor which the Contractor expects to perform Work must be accepted in writing by the Project Manager before the Subcontractor begins work. The acceptance or rejection of any proposed Subcontractor shall be at the Project Manager's sole discretion. The reasons the Project Manager may use for not accepting a Subcontractor include, but are not limited to, the following:
 - A. Default on a contract within the last five (5) years.
 - B. Default on a contract which required that a surety complete the contract under payment or performance bonds issued by the surety.
 - C. Debarment within the last five (5) years by a public entity or any organization which has formal debarment proceedings.
 - D. Significant or repeated violations of Federal Safety Regulations (OSHA).
 - E. Failure to have the specific qualifications listed in the Contract Documents for the work that the Subcontractor will perform.
 - F. Failure to have the required City or Colorado licenses to perform the work described in the subcontract.
 - G. Failure to pay workers the proper wage and benefits or to pay suppliers or subcontractors with reasonable promptness within the last five (5) years.
 - H. Conviction, plea of nolo contendere, entry into a formal agreement admitting guilt or entry of a plea of guilty or otherwise admitting culpability to criminal offenses of bribery, kickbacks, collusive bidding, bid-rigging, anti-trust, fraud, undue influence, theft, racketeering,

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extortion or any offense of a similar nature in connection with Subcontractor's business, on the part of Subcontractor's principal owners, officers, or employees, within the last five (5) years.

- I. Failure to pay taxes or fees to the City.
 - J. Evidence that the Subcontractor was selected by the Contractor through the process of bid shopping, dishonesty or buyout.
3. The Contractor shall submit a statement signed by an officer or principal of the Contractor certifying that the Contractor has investigated the qualifications and background of each proposed Subcontractor and certifying under oath that, to the best of his or her knowledge, none of the bases for rejection listed above exist. In lieu of this certification, the Contractor may identify, for each proposed Subcontractor, any of the issues listed above applicable to that Subcontractor and attach to that statement a list of all judicial and administrative proceedings in the last five (5) years in which any proposed Subcontractor is or was a party, the proceedings involving any of the issues listed above or in which any proposed Subcontractor filed for bankruptcy.
4. This Title 5 does not create, and shall not be interpreted as creating, any contractual relationship or privity of contract between the City and any Subcontractor. The acceptance or rejection of a proposed Subcontractor shall not create in that Subcontractor a right to any subcontract nor shall said acceptance or rejection relieve the Contractor of its responsibilities for the work of any Subcontractor.

SC-12 PAYMENT PROCEDURE

The application for payment shall be submitted through Textura® Corporations Construction Management Website. Contractor recognizes and agrees that it shall be required to use the Textura Construction Payment Management System ("CPM System") for this Project to request payment from the City and to pay subcontractors. All certified subcontractors or suppliers who are listed for participation towards any assigned program goal must be paid via Textura. Contractors are required, when preparing the GMP, to enter the price of the CPM service on the line provided for the service. The fee is all inclusive of all subcontractor, project and subscription fees associated with the CPM system. The Contractor will calculate the fee based on a percentage of their total bid, and then should include it on the line item provided in the bid form labeled **"Textura® Construction Payment Management System Fee"**. This expense becomes part of the contract and billable to the City. Textura will invoice the awarded contractor directly. All costs including but not limited to costs associated with training, entering data or utilizing Textura other than the Textura Construction Payment Management System Fee are overhead and shall not be reimbursed by the City. Contractor is responsible for tax on Textura fee. As with other taxes, the City will not reimburse Contractor for this cost and therefore this cost should be included in Contractor's bid. Textura will invoice the awarded contractor directly.

Project Value	Project Fee (GC + Sub Usage)
\$500,000 - \$999,999.99	\$3,250
\$1,000,000 - \$2,999,999.99	\$5,850
\$3,000,000 - \$4,999,999.99	\$9,100

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\$5,000,000 - \$9,999,999.99	\$12,220
\$10,000,000 - \$19,999,999.99	\$20,345
\$20,000,000 - \$49,999,999.99	\$32,500
\$50,000,000 - \$99,999,999.99	\$48,750
\$100,000,000 - \$199,999,999.99	\$69,095
\$200,000,000 - \$299,999,999.99	\$85,345
\$300,000,000 - \$399,999,999.99	\$109,720
\$400,000,000 - \$499,999,999.99	\$142,220
\$500,000,000 - \$999,999,999.99	\$162,500
\$1,000,000,000 - \$1,999,999,999.99	\$345,345
\$2,000,000,000 - \$4,999,999,999.99	\$650,000
\$5,000,000,000 - \$9,999,999,999.99	\$1,015,625
\$10,000,000,000 or greater	\$1,503,125

Contractor further agrees that, to the fullest extent possible within the CPM System, the City shall be entitled to all non-Confidential records, reports, data and other information related to the project that are available to Contractor through the CPM System, including, but not limited to, information related to Contractor and subcontractor billings. To that end, Contractor agrees that it will activate any available settings within the CPM System that are necessary to grant the City access to such non-Confidential information related to the contract and the project. Applications for payment shall be based on the Contract Unit Prices or the approved Schedule of Values described in GC 903.1

In accordance with General Contract Condition 902, PAYMENT PROCEDURE, the party(ies) responsible for review of all Pay Applications shall be:

<u>Agency/Firm</u>	<u>Name</u>	<u>Telephone</u>
Public Works – IPM Facilities Capital Projects	Chelsea Hahn	720-865-3189

In accordance with General Contract Condition 906, APPLICATIONS FOR PAYMENT, each Application submitted shall include the following:

1. The estimate of Work completed shall be based on the approved schedule of values or unit prices, as applicable, and the percent of the Work complete.
2. Each Application for Payment shall include each and every independent subcontractor's payroll information including pay dates and pay amounts.
3. The Contractor shall also submit to the Auditor and other appropriate officials of the City in a timely fashion, information required by General Contract Condition 1004, REPORTING WAGES PAID.

In accordance with General Contract condition 907, RELEASES AND CONTRACTORS CERTIFICATION OF PAYMENT, Applications for Payment must be accompanied by completed Partial or Final Claim Release Form, as appropriate, from EACH subcontractor and supplier, **AND/OR** the Contractors' Certification of Payment Form. The forms, Final/Partial Release and Certificate of Payment (Subcontractor/Supplier) and the Contractor's Certification of Payment, both of which must be used are attached.

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Special Condition 903, SCHEDULE OF VALUES FOR LUMP SUM CONTRACTS, is hereby deleted in its entirety and replaced by the following:

1. The Contractor shall furnish to the Project Manager, for review and approval, a Schedule of Values for lump sum subcontracts, in such detail as the Project Manager shall request, no later than thirty (30) Days prior to the issuance of the first pay application. The Schedule of Values shall show the amount included for each principal category of work and shall be in proper balance. No pay application shall be submitted until the submitted Schedule of Values is approved in writing by the Project Manager.
2. Should the City issue a Change Order that decreases or increases the Contract Amount, the Schedule of Values shall be modified to reflect the amount of such decrease or increase and resubmitted to the Project Manager at least fifteen (15) Days prior to the pay application reflecting such increase or decrease.

SC-14 APPLICATIONS FOR PAYMENT

General Condition 906, APPLICATIONS FOR PAYMENT, is hereby deleted in its entirety and replaced by the following:

1. Each complete application shall contain a list of Subcontractor and material invoices. If requested by the City, the Contractor will furnish the City with invoices shown on the lists which accompany any application for payment.
2. Application for payment shall be based on approved Cost of the Work items incurred, completed and/or certified by the Contractor. The application shall specify the Cost of the Work so certified as having been incurred by the Contractor for Work performed during the preceding period. The Contractor's Fee shall be paid based on the actual Cost of Work items incurred. Each application for payment shall also be accompanied by a written schedule of values which sets out the Cost of the Work for the Project together with the Contractor's accounting of the percentage of completion of each line item of Cost of the Work of which the City is liable to pay the Contractor.
3. The Contractor shall certify in writing with each application for payment that to its knowledge the Project will be completed at a cost within the Guaranteed Maximum Price, as modified by change orders, and shall identify with reasonable particularity any circumstances which could result in the total cost to the Contractor (including Fee) in completing the Project exceeding the Guaranteed Maximum Price.
4. Reserved
5. Each application for payment for materials or equipment stored on or off the Project site shall be accompanied by bills of sale to establish the City's title to such material or equipment free and clear of liens and encumbrances; evidence of property insurance covering such materials or equipment; evidence, as to material and equipment stored off the Project site, that the same have been properly labeled as the City's property and segregated from the vendor's other inventory; and, if

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required by the City, contracts and financing statements sufficient to create a security interest in favor of the City in materials or equipment stored off the Project site which remain in the possession of the vendor of such materials or equipment.

6. Each progress payment application shall show each Subcontractor or Supplier participating in the Work completed during the previous progress period and the dollar amount of such participation. The Contractor will assure that the Subcontractors and/or Suppliers are filing for and are being paid for only the value of materials and services delivered and performed upon or incurred for the Project and that the Subcontractors and/or Suppliers are not over-billing for the effort performed. The Contractor shall, prior to or with the submission of each application for payment, furnish to the City proper evidence accounting for the distribution to Subcontractors and/or Suppliers of funds received under prior applications together with proper releases and waiver, in form and content acceptable to the City, obtained in connection therewith.
7. If the Contractor disputes a Subcontractor's or Supplier's entitlement to a portion of the previous progress payment, the Contractor shall submit to the City copies of any written communication from the Contractor to such Subcontractor or Supplier explaining the Contractor's determination not to render payment to such Subcontractor or Supplier, together with proof of service of such written communication upon such Subcontractor or Supplier.
8. Each application for payment shall be signed. Such signed application for payment shall constitute a representation by the Contractor to the City that the Work has progressed to the point indicated; that the quality of the Work covered by the estimate is in accordance with the Contract Documents; that each obligation covered by the payment application has been properly incurred, is a proper charge and has not been the basis of any previous application (except as otherwise noted); that the money received as a result of the application will be used to discharge the Contractor's obligations under the Contract; and that the Contractor is entitled to payment in the amount requested. The Project Manager or the Design Consultant, as appropriate, must also verify and certify the estimate of Work completed prior to any acceptance by the City.
9. By submitting an application for payment, the Contractor warrants that: (i) the title to the Work covered by an application for payment will pass to the City upon receipt of payment by the Contractor; (ii) the Work covered by previous payment applications is free and clear of liens, claims, security interests or encumbrances, hereinafter referred to as "liens", except for any interest created by retainage; and (iii) no Work covered by an application for payment is subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Contractor or any other person or entity.
10. The Contractor shall not include in its application for payment any billing for defective Work or for work performed by Subcontractors or Suppliers if it does not intend to pay the Subcontractors or Suppliers for such work.
11. Approval of an application for payment of Work completed or actual payment by the City shall not foreclose the right of the City to examine the books and records of the Contractor to determine the correctness and accuracy of any item.

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12. Should the City decline or fail to approve for payment any items of the Contractor's Fee, the Cost of the Work, or any other item shown on an application for payment, the City shall notify the Contractor in writing, setting forth the reasons for such action. The City shall pay that portion of each payment application which is not disapproved in writing by the City.
13. No progress payment or partial or entire use or occupancy of the Project by the City shall constitute an acceptance of Work not in accordance with the Contract Documents.

SC-15 DISCOUNTS, REBATES AND REFUNDS

Cash discounts obtained on payments made by the Contractor shall accrue to the City if (1) before making the payment, the Contractor included them in an Application for Payment and received payment therefore from the City, or (2) the City has deposited funds with the Contractor with which to make payments; otherwise, cash discounts shall accrue to the Contractor. Trade discounts, rebates, refunds and amounts received from sales of surplus materials and equipment shall accrue to the City, and the Contractor shall make provisions so that they can be secured. Amounts which accrue to the City herein shall be credited to the City as a deduction from the Cost of the Work.

SC-16 ADJUSTMENT OF CONTRACT AMOUNT

General Condition 1104, ADJUSTMENT TO CONTRACT AMOUNT, is hereby deleted in its entirety and replaced by the following:

1. Contract Amount Adjustments. All adjustments to the Contract Amount shall be determined by using one or more of the following methods:
 - A. A negotiated lump sum. If requested by the City, the Contractor shall promptly provide itemized and sufficient substantiating data, including calculations, measurements, cost records, production rates, equipment types and capacity, labor costs by craft and other information which the City may reasonably require the Contractor to produce in order to permit the City to evaluate any lump sum Contractor Change Request. In pricing such proposals, the Contractor shall include estimates of the type of costs described in G.C. 1104.2.
 - B. Unit prices (as stated in the Contract Documents or subsequently agreed upon) multiplied by final verified quantities of work performed;
 - C. Costs as determined in a manner previously agreed upon by the parties, which include markups, that do not exceed those set forth in G.C. 1104.2 below; or
 - D. Time and Material costs as determined in the manner described in G.C. 1104.2, Calculation of the Contract Adjustment. These amounts may be reduced where necessary to take into account the cost of Base Contract Work, Work included in approved Change Orders, Work described in other Field Order/Change Directives, idle time for workers and/or

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equipment when Work could have been performed in other locations or when the number of workers or amount of equipment provided exceeded the number or amount required to perform the Work, unsatisfactory Work, or Work which may be or was performed concurrently with the changed Work and which cannot be easily segregated from the changed Work .

2. Calculation of the Contract Adjustment. In no event shall the charge or credit to the City associated with any change exceed the sum of the following:

- A. Direct Labor The actual net, direct increase or decrease in the cost of the Contractor's labor. Such cost shall include only the cost associated with the workers who actually perform the changed Work. The cost of supervision, management and field or office overhead shall not be included or calculated as a direct labor cost. For shop work, the direct labor cost shall include only those workers who work directly on the item being manufactured or the actual operators of the equipment being used to handle the items being manufactured.
- B. Labor Burden. Contractor's actual costs for worker's compensation and liability insurance, payroll taxes, social security and employees' fringe benefits (including employer paid health insurance) imposed on the basis of payrolls. This burden must reflect the variability of some burdens, ie social security. The burden shall be itemized and include all small tools and miscellaneous supplies. The total labor burden for such small tools shall not exceed two percent (2%) of the Direct Labor cost.
- C. Direct Material, Supplies, Installed Equipment. The actual net, direct cost of materials, supplies and equipment incorporated into or consumed by the Work. If actual costs are not available, this cost shall be the lowest commercially available price including all discounts and rebates and all applicable taxes. Such cost shall be based on buying the material, supplies and equipment in the largest practical quantity to receive quantity discounts.
- D. Equipment Costs. Without markup or operator, the lesser of (i) the actual net cost to the Contractor of owned or rented equipment, other than small tools; or (ii) the rental rate for such equipment as determined by using the following method(s):
 - (1) Equipment rental rates listed in the appropriate rental rate book currently in use by the Colorado Department of Transportation. If an item of equipment does not appear in the rental rate book currently in use by the Colorado Department of Transportation, the rental rates published by the Associated Equipment Dealers may be used as a basis for negotiating a rental rate for a particular piece of equipment. The Contractor shall provide all information necessary to determine the appropriate rental rate at the time the equipment is brought on the job. This shall include, but not be limited to, type, description, make, year, model, series, serial number, fuel type, transmission, wheel combination, GVW, capacity and equipment owner.

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- (2) Rental equipment costs shall be determined using actual invoiced rates, less all discounts for basic equipment rental.
- (3) Mobilization/demobilization costs will be paid if the equipment is mobilized exclusively for Work described in a Change Order. If the equipment is also used on Base Contract Work, no mobilization or demobilization cost will be paid. Mobilization/demobilization costs will be based on using the least expensive means to mobilize or demobilize Equipment shall be obtained from the nearest available source. When the least expensive methods are used, the costs shown in the actual invoice will be the basis for pricing.

E. Mark Up For Overhead And Profit.

- (1) The Contractor's Fee on the calculated change of Cost of Work shall be the only amount added to such calculated cost of Work to as markup and profit to the Contractor, including any fee on applicable Work self-performed by the Contractor.
- (2) A Subcontractor of any tier who actually performs the Work shall be entitled to a markup of twelve percent (12 %) on the actual costs for items A through D in GC 1104.2 above. Bonds and insurance are compensated at direct cost without markup.
- (3) A supervising Subcontractor (if any) shall be entitled to a three percent (3%) markup on the actual price charged to the Subcontractor by a Subcontractor of lower tier.
- (4) All of the Contractor's and Subcontractor's field and office overhead and supervision costs are included in the Fee and markups listed above.
- (5) Neither the Contractor nor Subcontractor of any tier, nor the City in the case of a credit, will apply or attempt to apply these percentage adjustments in a way which would pyramid either the cost or credit because of the involvement of a Subcontractor or sub-subcontractor. Written justification and approval shall be required for any percentages exceeding a total of fifteen percent (15%).

F. Bonds, Insurance, Permits And Taxes. The actual increases or decreases in the cost of premiums for bonds and insurance, permit fees, and sales, use or similar taxes related to the Work. The Contractor shall not be entitled to a Fee for any such costs.

3. Totals as Equitable Adjustment. The Contractor agrees that the total of the above items constitute an equitable adjustment for any and all costs or damages resulting from a change.

Exhibit B

4. No Equitable Adjustment for Obstruction by Contractor. No equitable adjustment shall be made as a result of costs resulting from any act, hindrance, obstacle, obstruction, interference or omission of the Contractor, its Subcontractors, Suppliers, or surety, or any other entity or individual acting on behalf of the Contractor.
5. Calculation of Certain Equitable Adjustments.
 - A. In case of delay in completion of the entire Contract due to drawings, designs or specifications which are defective and for which the City is responsible, the equitable adjustment for delays or costs incurred prior to notification to the City of such defect shall only include the extra cost and time reasonably incurred by the Contractor in attempting to comply with the defective drawings, designs or specifications before the Contractor identified, or reasonably should have identified, such defect.
 - B. An equitable adjustment shall not include increased costs for delay resulting from the Contractor's failure to continue performance during determination of any Contractor Change Request or claim.
6. Price Reductions for Defective Cost or Pricing Data. If it is later determined that pricing adjustments to the Contract were not correct due to incomplete or inaccurate pricing data by the Contractor or any Subcontractor or Supplier or that lower prices were reasonably available, the price shall be reduced accordingly and the Contract Amount modified by an appropriate Change Order.
7. Variation in Quantity of Unit Priced Items. Where the quantity of a unit-priced item in the Contract is an estimated quantity and the actual quantity of the unit-priced item varies more than twenty-five percent (25%) above or below the estimated quantity, and where this difference changes the total original Contract value by more than five percent (5%), an equitable adjustment in the Contract Amount may be made by Change Order. The equitable adjustment shall be based upon any increase or decrease in cost due solely to the variation above one hundred twenty-five percent (125%) or below seventy-five percent (75%) of the estimated quantity. If the quantity variation is such as to cause an increase in the time necessary for completing the Work, the Contractor may request, in writing, an extension of time in accordance with GC 1105.
8. Disposition of Excess or Obsolete Property. When the cost of materials, supplies, equipment or other personal property made obsolete or excess as a result of a delay is included in the equitable adjustment, the Project Manager shall have the right to prescribe the manner of disposition of such property.

SC-17 SURETY BONDS

General Condition 1501, SURETY BONDS, is hereby deleted in its entirety and replaced by the following:

1. Payment and performance bonds must be issued by a corporate surety authorized to do business in the State of Colorado and approved by the Mayor, the Manager and the City Attorney.

Exhibit B

2. Before the Contract is executed, the Contractor shall have furnished such surety bonds and appropriate Powers of Attorney as a guarantee of the faithful performance of the Contract and the payment of bills for labor and materials.
3. The Manager may direct, at his sole discretion, that the required payment and performance bonds be combined in a format approved by the City Attorney.
4. The Contractor shall provide a Consent of Surety for any duly executed Change Order that increases the Contract Amount, thereby increasing the penal sum of the bonds.
5. The form of the Performance and Payment Bond to be used by the Contractor is included in the Contract Documents.

SC-18 CONSTRUCTION INSPECTION BY THE CITY

General Condition 1701, CONSTRUCTION INSPECTION BY THE CITY, is modified as follows:

1. Persons who are employees of the City or who are under contract to the City or the City as lessee will be assigned to inspect and test the Work. These persons may perform any tests and observe the Work to determine whether or not designs, materials used, manufacturing and construction processes and methods applied, and equipment installed satisfy the requirements of the drawings and specifications, accepted Shop Drawings, Product Data and Samples, and the General Contractor's warranties and guarantees. The General Contractor shall permit these inspectors unlimited access to the Work and provide means of safe access to the Work, which cost shall be included as a Cost of the Work without any increase to the Guaranteed Maximum Price. In addition, General Contractor shall provide whatever access and means of access are needed to off-site facilities used to store or manufacture materials and equipment to be incorporated into the Work and shall respond to any other reasonable request to further the inspector's ability to observe or complete any tests. Such inspections shall not relieve the General Contractor of any of its quality control responsibilities or any other obligations under the Contract. All inspections and all tests conducted by the City are for the convenience and benefit of the City. These inspections and tests do not constitute acceptance of the materials or Work tested or inspected, and the City may reject or accept any Work or materials at any time prior to the inspections pursuant to G.C. 2002, whether or not previous inspections or tests were conducted by the inspector or a City representative.
2. The Building Inspection Division will perform building code compliance inspections for structures designed for human occupancy. It is the General Contractor's responsibility to schedule and obtain these inspections. If a code compliance inspection results in identification of a condition which will be at variance to the Contract Documents, the General Contractor shall immediately notify the Project Manager and confirm such notification with formal correspondence no later than forty-eight (48) hours after the occurrence.

Exhibit B

3. When any unit of government or political subdivision, utility or railroad corporation is to pay a portion of the cost of the Work, its respective representatives shall have the right to inspect the Work. This inspection shall not make any unit of government or political subdivision, utility or railroad corporation a party to the Contract, and shall not interfere with the rights of either party.

SC-19 AUTHORITY OF INSPECTORS

General Condition 1702, AUTHORITY OF INSPECTORS, is hereby deleted in its entirety and replaced by the following:

Inspectors assigned to the Work by the Project Manager are authorized to reject any Work, any materials, or any component of the Work which is not as required or specified in the Contract Documents. Such rejection will be confirmed by the Project Manager in writing to the Contractor. Inspections may extend to all or any part of the Work and to the preparation, fabrication or manufacture of the materials to be used. The inspector is not authorized to alter or waive the provisions of the Contract Documents, nor is the inspector authorized to issue instructions contrary to the provisions of the Contract Documents or to act as foreman for the Contractor.

SC-20 TERMINATION OF CONTRACT FOR CONVENIENCE OF THE CITY

General Condition 2202, TERMINATION OF CONTRACT FOR CONVENIENCE OF THE CITY, is hereby deleted in its entirety and replaced by the following:

1. The performance of Work under the Contract may be terminated without cause by the City in whole or in part whenever the Manager, in his sole discretion, shall determine that such termination is in the best interest and convenience of the City or whenever the City is prohibited from completing the Work for any reason. Such termination shall be effected by giving not less than three (3) Days' written notice to the Contractor specifying the extent to which performance of the Work is terminated and the date upon which such termination becomes effective.
2. Upon receipt of such notice of termination, the Contractor shall:
 - A. Stop work as specified in the notice;
 - B. Terminate all orders and subcontracts except as necessary to complete Work which is not terminated;
 - C. If directed in writing by the Manager to do so, assign all right, title, and interest in subcontracts and materials in progress, in which case the City will have the right, in its discretion, to settle or pay any or all Claims arising out of the termination of such subcontracts;
 - D. Settle outstanding liabilities and claims with the approval of the Manager;
 - E. Complete performance of such part of the Work as has not been terminated; and

Exhibit B

- F. Take such other actions as may be necessary, or as may be directed by the City, for the protection and preservation of the property related to the Contract.
3. Except as provided herein, any inventory resulting from the termination of the Contract may, with written approval of the Manager, be sold or acquired by the Contractor under the conditions prescribed by and at prices approved by the City.
 4. Upon receipt of notice of such termination, the Contractor shall submit to the Project Manager a request for final payment, in a form and with certification prescribed by the City. Such request shall be submitted promptly but in no event later than sixty (60) Days from the effective date of termination, unless extended in writing by the Project Manager upon the written request of the Contractor within such sixty (60) Day period.
 5. The final payment to the Contractor after a termination for convenience shall be calculated by adding the following amounts:
 - (1) Any actual costs incurred by the Contractor since the last approved pay request that are reimbursable as a Cost of the Work plus the proportionate Fee on such costs;
 - (2) The actual costs incurred by the Contractor for terminating the Work and for protecting the Work in the manner, if any, directed by the City, plus the proportionate Fee on such costs; and
 - (3) The amount of retainage withheld by the City to date.
 6. The acceptance of final payment as calculated above shall constitute a waiver of all Claims by the Contractor except those previously made in accordance with G.C. 1301 which have been separately identified by the Contractor as unsettled in the final Project Application for Payment.
 7. The Manager may, from time to time, under such terms and conditions as the Manager may prescribe, authorize partial payments and payments against costs incurred by the Contractor for the terminated portion of the Contract, if it is estimated that the total of such payments will not exceed the amount to which the Contractor will be entitled. If the total of such payments is in excess of the amount to which the Contractor is entitled, the excess shall be payable by the Contractor to the City upon demand, together with interest computed pursuant to statute, for the period from the date the excess payment is received by the Contractor to the date the excess is repaid to the City.
 8. The settlement for the Work performed shall not relieve the Contractor or its surety from responsibility for defective Work and/or materials on the completed portion of the Work nor for labor and materials or any other items as guaranteed by the surety bond or bonds.
 9. The City shall be given full access to all books, correspondence, records, electronic files and data bases, and other materials of the Contractor relating to the Contract in order to determine the amounts to be paid on account of the termination of the

Exhibit B

Contract under this G.C. 2202. The Contractor shall, as requested by the City, furnish clear copies of any such materials.

10. In the event the parties fail to agree in whole or in part on the amount or amounts to be paid to the Contractor in connection with the termination of work pursuant to this G.C. 2202, the Contractor may appeal the Project Manager's determination as to the amount owed in accordance with Title 13, except that, if the Contractor has failed to submit its request for payment within the time provided above and has failed to request an extension of such time, it shall have no such right of appeal.

SC-21 SUBCONTRACTS

In accordance with General Contract Condition 501, SUBCONTRACTS, no limit shall apply to that percentage of the Work, which may be sublet providing that the subcontractors receive prior approval in accordance with General Contract Condition 502, SUBCONTRACTOR ACCEPTANCE.

SC-22 RESERVED

SC-23 DISPOSAL OF NON-HAZARDOUS WASTE AT DADS

In accordance with the Landfill Agreement made between the City and Waste Management of Colorado, Inc., bidders will be required to haul dedicated loads (non-hazardous entire loads of waste) to the Denver-Arapahoe Disposal Site ("DADS") for disposal. DADS is located at Highway 30 and Hampden Avenue in Arapahoe County, Colorado. The City will pay all fees associated with such disposal but the bidder shall be responsible for the costs of transporting the loads. Non-hazardous waste is defined as those substances and materials not defined or classified as hazardous by the Colorado Hazardous Waste Commission pursuant to C.R.S. §25-15-207, as amended from time to time, and includes construction debris, soil and asbestos. Bidders shall not use Gun Club Road between I-70 and Mississippi Avenue as a means of access to DADS.

SC-24 PROHIBITION ON USE OF CCA-TREATED WOOD PRODUCTS

The use of any wood products pressure-treated with chromated copper arsenate (CCA) is prohibited. Examples of CCA-treated wood products include wood used in play structures, decks, picnic tables, landscaping timbers, fencing, patios, walkways and boardwalks.

SC-25 WAIVER OF: PART 8 OF ARTICLE 20 OF TITLE 13, COLORADO REVISED STATUTES.

The Contractor specifically waives all the provisions of Part 8 of Article 20 of Title 13, Colorado Revised Statutes regarding defects in the Work under this Construction Contract.

SC-26 DEBARRED SUBCONTRACTORS PROHIBITED

The Contractor is prohibited from hiring any subcontractor currently debarred by the City in accordance with section 20-77 of the Denver Revised Municipal Code.

SC-27 ATTORNEY'S FEES

Exhibit B

Colorado Revised Statute 38-26-107 requires that in the event any person or company files a verified statement of amounts due and unpaid in connection with a claim for labor and materials supplied on this project, the City shall withhold from payments to the Contractor sufficient funds to insure the payment of any such claims. Should the City and County of Denver be made a party to any lawsuit to enforce such unpaid claims or any lawsuit arising out of or relating to such withheld funds, the Contractor agrees to pay to the City its costs and a reasonable attorney's fee which cost shall be included as a Cost of the Work.

Because the City Attorney Staff does not bill the City for legal services on an hourly basis, the Contractor agrees a reasonable fee shall be computed at the rate of one hundred dollars per hour of City Attorney time.

SC-28 **INSURANCE**

General Condition 1601 is hereby deleted in its entirety and replaced with the following:

1. General Conditions: Contractor agrees to secure, at or before the time of execution of this Agreement, the following insurance covering all operations, goods or services provided pursuant to this Agreement. Contractor shall keep the required insurance coverage in force at all times during the term of the Agreement, or any extension thereof, during any warranty period, and for eight (8) years after termination of the Agreement. The required insurance shall be underwritten by an insurer licensed or authorized to do business in Colorado and rated by A.M. Best Company as "A-"VIII or better. Each policy shall contain a valid provision or endorsement requiring notification to the City in the event any of the required policies be canceled or non-renewed before the expiration date thereof. Such written notice shall be sent to the parties identified in the Notices section of this Agreement. Such notice shall reference the City contract number listed on the signature page of this Agreement. Said notice shall be sent thirty (30) days prior to such cancellation or non-renewal unless due to non-payment of premiums for which notice shall be sent ten (10) days prior. If such written notice is unavailable from the insurer, contractor shall provide written notice of cancellation, non-renewal and any reduction in coverage to the parties identified in the Notices section by certified mail, return receipt requested within three (3) business days of such notice by its insurer(s) and referencing the City's contract number. If any policy is in excess of a deductible or self-insured retention, the City must be notified by the Contractor. Contractor shall be responsible for the payment of any deductible or self-insured retention. The insurance coverages specified in this Agreement are the minimum requirements, and these requirements do not lessen or limit the liability of the Contractor. The Contractor shall maintain, at its own expense, any additional kinds or amounts of insurance that it may deem necessary to cover its obligations and liabilities under this Agreement.

2. Proof of Insurance: Contractor shall provide a copy of this Agreement to its insurance agent or broker. Contractor may not commence services or work relating to the Agreement prior to placement of coverages required under this Agreement. Contractor certifies that the certificate of insurance attached as **Exhibit ____**, preferably an ACORD certificate, complies with all insurance requirements of this Agreement. The City requests that the City's contract number be referenced on the Certificate. The City's acceptance of a certificate of insurance or other proof of insurance that does not comply with all insurance requirements set forth in this Agreement shall not act as a waiver of Contractor's breach of this Agreement or of any of the City's rights or remedies under this Agreement. The City's Risk Management Office may require additional proof of insurance, including but not limited to policies and endorsements.

Exhibit B

3. **Additional Insureds:** For Commercial General Liability, Auto Liability and Contractors Pollution Liability, Contractor and subcontractor's insurer(s) shall name the City and County of Denver, its elected and appointed officials, employees and volunteers as additional insured.

4. **Waiver of Subrogation:** For all coverages required under this Agreement, Contractor's insurer shall waive subrogation rights against the City.

5. **Subcontractors and Subconsultants:** All subcontractors and subconsultants (including independent contractors, suppliers or other entities providing goods or services required by this Agreement) shall be subject to all of the requirements herein and shall procure and maintain the same coverages required of the Contractor. Contractor shall include all such subcontractors as additional insured under its policies (with the exception of Workers' Compensation) or shall ensure that all such subcontractors and subconsultants maintain the required coverages. Contractor agrees to provide proof of insurance for all such subcontractors and subconsultants upon request by the City.

6. **Workers' Compensation/Employer's Liability Insurance:** Contractor shall maintain the coverage as required by statute for each work location and shall maintain Employer's Liability insurance with limits of \$100,000 per occurrence for each bodily injury claim, \$100,000 per occurrence for each bodily injury caused by disease claim, and \$500,000 aggregate for all bodily injuries caused by disease claims. . If an exposure exists, the U.S. Longshore and Harborworkers Compensation Act endorsement shall be attached to the policy. Contractor expressly represents to the City, as a material representation upon which the City is relying in entering into this Agreement, that none of the Contractor's officers or employees who may be eligible under any statute or law to reject Workers' Compensation Insurance shall effect such rejection during any part of the term of this Agreement, and that any such rejections previously effected, have been revoked as of the date Contractor executes this Agreement.

7. **Commercial General Liability:** Contractor shall maintain a Commercial General Liability insurance policy with limits of \$1,000,000 for each occurrence, \$1,000,000 for each personal and advertising injury claim, \$2,000,000 products and completed operations aggregate, and \$2,000,000 policy aggregate.

8. **Business Automobile Liability:** Contractor shall maintain Business Automobile Liability, or its equivalent, with minimum limits of \$1,000,000 combined single limit applicable to all owned, hired and non-owned vehicles used in performing services under this Agreement. If transporting wastes, hazardous material, or regulated substances, Contractor shall carry a pollution coverage endorsement and an MCS 90 endorsement on their policy. Transportation coverage under the Contractors Pollution Liability policy shall be an acceptable replacement for a pollution endorsement to the Business Automobile Liability policy.

9. **Excess/Umbrella Liability:** Contractor shall maintain excess liability limits of \$3,000,000. Coverage must be written on a "follow form" basis. Any combination of primary and excess coverage may be used to achieve required limits.

10. **Builders Risk or Installation Floater:** Contractor shall maintain limits equal to the completed value of the project. Coverage shall be written on an all risk, replacement cost basis including coverage for soft costs, flood and earth movement, if in a flood or quake zone, and,

Exhibit B

if applicable, equipment breakdown including testing. Contractor is responsible for payment of all policy deductibles. The City and County of Denver, Contractor, and sub-contractors shall be named insureds under the policy. Policy shall remain in force until acceptance of the project by the City.

11. Contractors Pollution Liability: Contractor shall maintain limits of \$1,000,000 per occurrence and \$2,000,000 policy aggregate. Policy to include bodily injury; property damage including loss of use of damaged property; defense costs including costs and expenses incurred in the investigation, defense or settlement of claims; and clean up costs. Policy shall include a severability of interest or separation of insured provision (no insured vs. insured exclusion) and a provision that coverage is primary and non-contributory with any other coverage or self-insurance maintained by the City.

12. Additional Provisions:

(a) For Commercial General Liability, Excess Liability and Contractors Pollution Liability the policies must provide the following:

- (i) That this Agreement is an Insured Contract under the policy;
- (ii) Defense costs are outside the limits of liability;
- (iii) A severability of interests or separation of insureds provision (no insured vs. insured exclusion); and
- (iv) A provision that coverage is primary and non-contributory with other coverage or self-insurance maintained by the City.

(b) For claims-made coverage:

- (i) The retroactive date must be on or before the contract date or the first date when any goods or services were provided to the City, whichever is earlier.

(c) Contractor shall advise the City in the event any general aggregate or other aggregate limits are reduced below the required per occurrence limits. At their own expense, and where such general aggregate or other aggregate limits have been reduced below the required per occurrence limit, the Contractor will procure such per occurrence limits and furnish a new certificate of insurance showing such coverage is in force.

EXHIBIT C



Division of Small Business Opportunity
101 W Colfax Ave, Ste 850
Denver, CO 80202
p: 720.913.1714
www.denvergov.org/dsbo

Denver International Airport
Airport Office Building, Suite 7810
8500 Pena Blvd
Denver, CO 80249
p: 303.342-2180
www.flydenver.com

January 15, 2019

Graham Johnson
Spectrum General Contractors
5135 E. 38th Avenue
Denver, CO 80207

Email: grahamj@spectrumgc.com

Re: Sullivan Gateway Rehabilitation Phase 3 Construction Manager / General Contractor
(CM/GC) Services # 201946720 – Compliance Plan

Dear Graham:

The Division of Small Business Opportunity (DSBO) has reviewed the attached Compliance Plan that your company submitted for the above referenced subcontract and has determined that this plan complies with the MBE/WBE requirements according to Chapter 28, Article III, Division 3 of the Denver Revised Municipal Code (DRMC).

DSBO approves the Compliance Plan, signed on January 10, 2019, and the commitment to meet or exceed the 7% M/WBE goal for the total construction price under the contract.

Should you have any questions, contact Imogene Manuelito, Compliance Coordinator, at 720-913-1571 or email at: imogene.manuelito@denvergov.org

Sincerely,

A handwritten signature in blue ink, appearing to read "Sylvia S. Smith", with a long horizontal flourish extending to the right.

Sylvia S. Smith, Interim Director
Division of Small Business Opportunity

CC: Imogene Manuelito, Compliance Coordinator
Chelsea Hahn, Project Manager
Dani Abbott, Contract Administrator

EXHIBIT C

CITY AND COUNTY OF DENVER
DIVISION OF SMALL BUSINESS OPPORTUNITY

CONSTRUCTION CONTRACT COMPLIANCE PLAN
FOR M/WBE PARTICIPATION

SPECTRUM GENERAL CONTRACTORS INC

SULLIVAN GATEWAY REHABILITATION PHASE 3
CONSTRUCTION MANAGER / GENERAL CONTRACTOR (CM/GC) SERVICES
Contract No. 201946720

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**CITY AND COUNTY OF DENVER
DIVISION OF SMALL BUSINESS OPPORTUNITY
CONSTRUCTION CONTRACT COMPLIANCE PLAN
FOR M/WBE PARTICIPATION
SPECTRUM GENERAL CONTRACTORS INC
SULLIVAN GATEWAY REHABILITATION PHASE 3
CONSTRUCTION MANAGER / GENERAL CONTRACTOR (CM/GC) SERVICES
Contract No. 201946720**

SECTION 1: INTRODUCTION

Spectrum General Contractors, Inc. ("Contractor") submits this Compliance Plan to the Director of the Division of Small Business Opportunity ("Director"), as required by the Manager of Public Works, in accordance with §§28-51 to 28-83, Denver Revised Municipal Code (D.R.M.C.), and the implementing rules adopted by the Director.

- A. Under the City's Ordinance No. 85, ("M/WBE Ordinance"), codified at §§28-51 to 28-83, D.R.M.C., the M/WBE participation goal for this contract is **7%** (seven). The good faith solicitation level is 100%
- B. The Contractor is committed to compliance with the Minority/Women Business Enterprise (M/WBE) Ordinance in its performance of the Contract. The Contractor will continually pursue a level of M/WBE participation that equals or exceeds **7%** of the total construction price under the Contract.
- C. Because of the delivery method used for this Project, the work was not ready for subcontracting at the time when the Contractor was awarded the Contract. Therefore, this Compliance Plan provides for the M/WBE solicitation and subcontracting to be performed after contract formation. The process by which the Contractor will solicit, obtain, count and maintain participation by Minority Business Enterprise (MBE) and Women Business Enterprise (WBE) firms for this Project under this Compliance Plan, will be same as the M/WBE Ordinance requires for "design-bid-build" construction contracts.
- D. This Compliance Plan describes how the Contractor will address the project goal at the point where the project work is sufficiently defined that the process of obtaining subcontractors and suppliers can begin, by committing to utilize MBE/WBEs for the Project work, using the good faith efforts as defined by the M/WBE Ordinance.
- E. The delivery method for this project under the Contract is **CM/GC**.
- F. The Contractor **will not** deliver the construction work in phases. [If the work will be delivered in phases, Section 3 below describes the Contractor's plan to meet the project goal as it relates to such phases.]

SECTION 2: KEY PERSONNEL

Graham Johnson, (303) 981-8280, grahmj@spectrumgc.com, has been assigned as the Project Manager for this Contract. The Project Manager is responsible for the overall management of the Contractor's performance of the Project.

Breanna Rice, (303) 329-8003, breannar@spectrumgc.com, is the Assistant Project Manager, who reports to the Project Manager and is responsible for compliance with this Compliance Plan, outreach and coordination activities, and maintaining appropriate records to ensure that goals are met.

Krystle Tibbitts, (303) 329-8003, krystlet@spectrumgc.com is the Controller, who will administer subcontracts and ensure that all documentation required by Division of Small Business Opportunity (DSBO) is prepared and maintained. Krystle Tibbitts will coordinate the collection of DSBO documentation and monthly payroll reports from all subcontractors and suppliers, including but not limited to M/WBEs.

SECTION 3: STRUCTURING BID PACKAGES FOR M/WBE PARTICIPATION

- A. The Contractor has identified preliminary the following separate packages of work to be subcontracted:

GOALS SCHEDULE CHART				
Available Sub-Trade	Approximate Dollar Amount	Percentage of Total Project	Assigned MWBE Goal Per Section	Anticipated Resulting MWBE Participation
Masonry	\$1,368,802.84	72.07%	3.5%	72.07%
Landscape/Irrigation	\$94,975.95	5.00%	3.5%	5.00%
Site Pavement/Concrete	\$35,105.75	1.85%	0.0%	0%
Electrical	\$63,109.00	3.32%	0.0%	0%
Ornamental Metals	\$15,815.00	0.83%		
SUBTOTAL			7.0%	77.07%
Design	NA		NA	0%
Self-Performance (General Conditions etc.)	\$321,544.73	16.93%	NA	0%
TOTAL	\$1,899,353.27	100.00%	7.0%	77.07%

B. These packages will be reviewed and refined as the work for the Contract is further defined and ready for the process of subcontracting. Specifically, prior to advertising any package of work for bids or proposals, the Contractor will review the work in detail, to determine the types of work that can be performed by M/WBE firms, with reference to the DSBO's database and directory of certified M/WBE firms, and will adjust its subcontracting packages to maximize opportunities for M/WBE participation in such subcontracting, within economically feasible packages.

C. The Contractor has the following preliminary schedule for issuance of each bid package:

10/22/18 GMP Bid invitation sent to bidding subcontractors.

11/15/18 GMP bid revisions updated per owner VE comments.

D. Safety, Quality, and Timeliness are our concerns at this time. We will host safety meetings along with a third-party vendor to provide compliance safety inspections to help to minimize these concerns. A strong team of sub-contractors with good communication will ensure quality and schedule coordination with look ahead planning to manage timeliness. Specific to this project, the fabrication of Terracotta material is an extremely long lead time and will be pre-ordered to ensure material is ready at the time of project commencement.

E. We will prequalify subcontractors to ensure they have the experience and bandwidth to complete the project with in the safest, highest quality, and time frame needed. Our list currently includes Building Restoration Specialties, Apco Electric, and Native Landscaping.

*REVISION: Per direction of the City of Denver project manager, subcontracted scope of work will be competitively bid due to unique circumstance of single prime contractor during city selection process.

F. The Contractor may pursue different percentage goals for M/WBE participation in each separate package of work put out for bids, based on the types of work and availability of certified M/WBE firms. However, the Contractor is committed to the overall goal of 7% M/WBE participation in the total construction work amount.

G. The Contractor may consider, in order to maximize M/WBE participation, subcontracting the following types of work which it might ordinarily self-perform: Masonry and Electrical are the trades that have strong M/WBE representation among our bidders list. We will continue to solicit proposals from a wide variety of subcontractors to support the project scope.

Landscaping

SECTION 4: COMMUNITY OUTREACH EFFORTS AND ADVERTISING TO M/WBE CERTIFIED FIRMS

The Contractor will conduct the following outreach efforts:

A. Contractor will use the City's M/WBE directory and encourage all non-M/WBE subcontractors to use the directory when soliciting any of their own subcontractors or suppliers for the project.

EXHIBIT C

- B. If during outreach efforts, Contractor locates a firm which appears to be eligible for City M/WBE certification but is not so certified, Contractor will direct the firm to DSBO and encourage the firm to pursue certification if eligible.
- C. When it has work packages ready for subcontracting, the Contractor will publish notices in The Daily Journal and other local publications and websites, identifying the subcontracting opportunities and specifically soliciting City-certified M/WBE participation. The Contractor will also provide notice of all such solicitations to relevant organizations such as, but not limited to, the Colorado Black Chamber of Commerce, Rocky Mountain Minority Supplier Development Council, Hispanic Contractors of Colorado, and the Colorado Women's Chamber of Commerce. Notices will be published or provided no less than 10 calendar days before bids are due on the work.
- D. Contractor will conduct at least one pre-bid meeting, as announced in published notices, which all interested subcontractors and suppliers may attend, at which the Contractor will present information and answer questions about the work.
- E. During the bidding process Spectrum will make its management available for additional site meetings, conference calls and coordination discussion to ensure that qualified bidders are well informed of project specifications and requirements. This preconstruction effort ensures that bids are complete and competitive among common trades.
- F. We will look for bids from qualified contractors, and select the most competent, M/WBE being preferable, and select the best qualified subcontractor. Spectrum uses Procore software to distribute bidding information and gather bids from subcontractors. The software allows all relevant project information – drawings, specifications and schedule to be hosted in one location for all bidders to access. Once bids are received, all bids are reviewed for completeness and consistency. Any inclusions or exclusions are clarified and final budgets are compiled. In addition, the following items are included:
- Our bid invitation includes insurance requirements, past project experience minimums and specific qualifications relevant to historically sensitive projects. Most of these are established through previous working relationships but new subs are also thoroughly vetted.
 - From bid invitation to due date we strive to allow 2 weeks for subcontractor review but no less than 10 days.
 - All relevant evaluation criteria from the original RFP / RFQ will be shared with bidding subcontractors.
 - If a new subcontractor is bidding, their qualifications are confirmed as part of the bidding process.
 - In addition to bid invitations which are sent to qualified firms from previous experience, company-wide meetings are held to collaborate and brainstorm about potential bidders for each project that Spectrum pursues. Publicly advertised bids are

always accepted and checked for conformance as well as bids that come through mutual suppliers of competing bidders.

- Bidding communication is kept via email, bidder's logs and meeting records for site visits.
- Spectrum uses standard subcontracting processes for all firms, any contracts awarded to non-MWBE firms will be noted as such in project reporting. Based on current bidding returns our team feels confident in meeting the 7% overall goal for the Sullivan Gate project.

G. The Contractor will send to each bidder/proposer, a Notice of Selection for each subcontract for which it solicited M/WBE participation, no later than 30 days after it has entered into the subcontract, so that unsuccessful bidders/proposers are aware of the result of the bid/proposal process.

SECTION 5: M/WBE PARTICIPATION; MAINTAINING COMMITMENTS

- A. When issuing each work package for bid under the Contract, the Contractor will make a good faith effort to meet or exceed the goal percentage of M/WBE participation which it has identified for that package. The minimum level of these efforts is specified in §28-62(b), D.R.M.C. and Rule VII(B). They may include, but will not be limited to, the outreach activities identified in Section 4 above.
- B. When requested by DSBO, the Contractor will submit bid packages to DSBO for review and comment. When requested by DSBO, the Contractor will submit bid tabulation sheets to DSBO for review.
- C. The Contractor will report to DSBO the total M/WBE participation obtained for each bid package. No later than 5 days after issuing Notice to Proceed for such work, the Contractor will submit to DSBO, for each M/WBE subcontractor or supplier with whom it contracts, a Letter of Intent and other documentation, in accordance with Section _ below.
- D. The Contractor will document its efforts to obtain M/WBE participation for each work package, and submit such documentation to DSBO upon request by DSBO at any time. The Contractor acknowledges that it may meet or exceed a percentage goal for M/WBE participation on one or more work packages, but fall short of meeting the participation goal for the total construction contract amount. Therefore the Contractor must be able to demonstrate its good faith effort, consistent with §28-62(b), D.R.M.C., to obtain M/WBE participation for each bid package under the contract, except for bid packages which are subject to a "modified good faith effort" under §28-75(c), D.R.M.C., in which case the Contractor must be able to demonstrate its compliance with the requirements of §28-75(c), D.R.M.C. §28-62(b) and 28-75(c), D.R.M.C., are attached to this Compliance Plan as Attachment 1, for convenient reference
- E. The M/WBE participation percentage will be calculated by dividing the total value of the M/WBE participation by the total contract amount for the project, including all change

EXHIBIT C

orders. The Contractor will count M/WBE participation according to the M/WBE Ordinance, including §28-63, D.R.M.C., and Rule VII(C).

- F. As required by D.R.M.C. §28-73, the Contractor shall immediately inform the DSBO in writing of any agreed-upon increase or decrease in the scope of work of the Contract, regardless of whether it has been reduced to writing at the time of notification. Any increase in the scope of work which increases the dollar value of the contract, whether or not such change is within the scope of work designated for performance by an MBE or WBE under any subcontract, shall be contemporaneously submitted to the DSBO. Those changes to the scope of work that cannot be performed by existing project participants (the Contractor, subcontractors, suppliers, etc.) shall be subject to a goal for MBEs and WBEs equal to the original committed goal. The Contractor shall satisfy the goal for the changed scope of work by soliciting new MBEs or WBEs in accordance with §28-60, D.R.M.C., and it must show each element of modified good faith that is stated in §28-75(c), D.R.M.C. The Contractor shall provide to the Director the documentation described in §28-75(c) with respect to the increased dollar value of the contract.
- G. The Contractor will comply with the provisions of §28-75 as to the replacement of a WBE or MBE on the Project.
- H. The Contractor acknowledges that it has a continuing duty, under D.R.M.C. §§28-72, 28-73, and 28-75, to maintain, throughout the duration of the contract, compliance with the level of MBE and WBE participation committed to under any approved compliance plan, and that such commitment is a material condition of the Contract.

SECTION 6: COMPLIANCE DOCUMENTS AND REPORTING

- A. The Contractor will submit the following documentation, properly completed and submitted monthly or when otherwise required by DSBO.
 - 1. Prime contractor background information form*
 - 2. DSBO Schedule of Work form*
 - 3. Subcontractor background information form for all subcontractors*
 - 4. M/WBE Letters of Intent
 - 5. Monthly contractor's certification of payment forms (participation report)
 - 6. DSBO change order forms
 - 7. M/WBE final lien release form
- B. The Contractor will document its progress in seeking and obtaining M/WBE participation as required by DSBO. Records of the Contractor's efforts to solicit M/WBE subcontractor and supplier participation, will be maintained and reported monthly to DSBO, or as otherwise required, including:
 - 1. Dates of solicitation
 - 2. Names, addresses and telephone numbers of all M/WBE firms contacted.
 - 3. Description of efforts made to contact M/WBE firms.
 - 4. Description of information provided to M/WBE firms.

5. Description of the process and outcome.
6. Advertisements soliciting bids from M/WBE firms in local community publications or construction industry related publications.
7. Schedules of pre-bid meetings to inform M/WBE and non-M/WBE subcontractors and suppliers of opportunities to participate.
8. Evidence that the Contractor provided M/WBE subcontractors and suppliers necessary access to and adequate time to review all project documents.
9. All other documentation required to establish the Contractor's compliance with the good faith efforts required by City ordinance, specifically the items enumerated in §28-62(b)(2) through §28-62(b)(10) D.R.M.C.

SECTION 7: PLAN ADMINISTRATION; MONITORING; CLOSEOUT

- A. DSBO shall have prompt, full and complete access to all Contractor and subcontractor personnel, books and records required to monitor and assure performance of this Compliance Plan.
- B. The Contractor's personnel identified in Section 2 above, will be responsible for administering and monitoring the Contractor's performance of this Compliance Plan.
- C. Actual M/WBE participation will be calculated in accordance with the M/WBE Ordinance, including § 28-63, D.R.M.C., and applicable Rules. The Contractor will submit to DSBO a monthly tracking report demonstrating the M/WBE participation that has been achieved.
- D. The following milestones for review and reconciliation of M/WBE participation will be observed during the contract: At the bid process, during the project when changes and new work may become needed, and upon completion we will review the efforts put into supporting the M/WBE subcontractors.
- E. The Contractor acknowledges that the City may impose monetary penalties and/or withhold payment in the event of Contractor's non-compliance with the M/WBE Ordinance and this Compliance Plan.
- F. The Contractor will use the following methodology for final reconciliation of M/WBE participation performance achieved during the Contract term, measured against the established project goal. The Contractor will present copies of all signed DSBO Final Lien Release forms for MWBE firms utilized for participation on the Contract. DSBO will compare the Final Monthly Participation Report submitted by the Contractor to determine if the Final Lien Release dollar figures match what is contained within the Final Monthly Participation Report. Final Compliance shall be achieved when the Contractor establishes to the Director's satisfaction, that it has remitted payments to M/WBE firms utilized on the Project; that it utilized M/WBE firms in accordance with each such firm's Letter of Intent; and that the amount of payments to M/WBE firms equals or exceeds the assigned M/WBE goal for the total amount of the Contract. Failure to achieve final compliance may subject the Contractor to sanctions, in accordance with D.R.M.C, Section 28-77. As provided in such ordinance, sanctions may include, but are not limited to, assessment by the Director of a

monetary penalty against the Contractor in an amount not more than 150% of the contract amount for each MBE or WBE involved. Any such monetary penalty leveled by the Director shall be withheld from the final payment due to the Contractor, and any amount that remains due and owing to the City may be collected pursuant to D.R.M.C., Section 28-77. The Contractor may seek review of any such determination by the Director to levy sanctions through the dispute resolution process set forth in the Construction Contract.

SECTION 8: NON-COMPLIANCE; SANCTIONS; REMEDIATION PLAN

- A. At all times, DSBO shall monitor the Contractor's compliance with this Plan and the M/WBE Ordinance and Rules. The Contractor shall fully cooperate with DSBO's compliance monitoring and auditing efforts, including DSBO's investigation of any alleged or suspected non-compliance by the Contractor.
- B. If the Director has reason to believe that the Contractor is not in compliance with this Plan or with the M/WBE Ordinance, the Director shall give the Contractor written notice of non-compliance, citing the reasons why the Contractor is not in compliance, and giving the Contractor thirty (30) days in which to submit a remediation plan for the Director's review and acceptance. The remediation plan shall demonstrate how the Contractor will cure such non-compliance, and if such non-compliance consists of failure to obtain or maintain M/WBE participation at the committed level, that the Contractor's M/WBE participation level will again achieve the committed level, and that the Contractor will ultimately achieve the committed participation goal for the contract.
- C. The Contractor shall, within such thirty (30) day period, deliver to the Director a written remediation plan the Director's review and approval.
- D. The Director may issue a written determination of non-compliance and the sanction which the Director has elected to impose as a consequence:
 - 1. If the Contractor does not respond within the time allowed; or
 - 2. If the Contractor fails to submit a satisfactory remediation plan; or
 - 3. If a Contractor submits an acceptable remediation plan but thereafter fails to comply with the plan.
- E. The Contractor may contest a determination issued under Section 8(D), by requesting a hearing within 30 days after the date of such determination, as provided in §28-33, D.R.M.C.

SECTION 9: MEDIATION

The Contractor will provide a process to resolve disputes that occur between a MBE or WBE and any non-M/WBE subcontractors or suppliers under the Contract. The Contractor will document such disputes and inform DSBO of the steps the Contractor plans to take to resolve the dispute. The Contractor may ask DSBO to assist in the resolution process it has developed. The Contractor will document and notify DSBO if those disputes have been resolved and inform DSBO of any disputes it was unable to resolve. DSBO will notify the Contractor of any

EXHIBIT C

complaints received by DSBO from M/WBE firms regarding a dispute they are experiencing with either a subcontractor or the Contractor.

IN WITNESS WHEREOF, Contractor has executed and agrees to abide by the terms of this Compliance Plan as of the 10th day of January, 2019.

Contractor: Spectrum General Contractors

By:

— 

Digitally signed by Graham Johnson
DN: cn=Graham Johnson, o=Spectrum
General Contractors, ou,
email=grahamj@spectrumgc.com, c=US
Date: 2019.01.11 15:13:02 -07'00'

ATTACHMENT 1

EXCERPTS FROM DENVER REVISED MUNICIPAL CODE

Sections 28-62(b) and 28-75(c), D.R.M.C

Sec. 28-62. Same--Good faith efforts.

(b) The statement of good faith efforts shall include a specific response and verification with respect to each of the following good faith effort categories, which may be further defined by rule or regulation. A bidder or proposer may include any additional information it believes may be relevant. Failure of a bidder or proposer to show good faith efforts as to any one (1) of the following categories shall render its overall good faith effort showing insufficient and its bid or proposal non-responsive:

- (1) If prebid or preselection meetings are scheduled by the city at which MBEs and WBEs may be informed of subcontracting or joint venture opportunities under a proposed contract to be bid, or procured pursuant to the competitive selection process, attendance at such prebid or preselection meetings is not mandatory; however, bidders and proposers are responsible for the information provided at these meetings.
- (2) The bidder or proposer must solicit through all reasonable and available means, the interest of all MBEs and WBEs certified in the scopes of work of the contract. The bidder or proposer must solicit the interest of such MBEs and WBEs within sufficient time, prior to the bid opening or date of final project-specific proposal in the case of a competitive selection process, to allow such MBEs and WBEs to respond to the solicitation. The bidder or proposer must determine with certainty if the MBEs and WBEs are interested by demonstrating appropriate steps to follow up initial solicitations.
- (3) The bidder or proposer must select portions of the work of the contract to be performed by MBEs and WBEs in order to increase the likelihood that the project goal will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate MBE and WBE participation as subcontractors or joint venturers, and for bidder or proposer self-performed work, as suppliers, manufacturers, manufacturer's representatives and brokers, all reasonably consistent with industry practice, even when the bidder or proposer would otherwise prefer to perform these work items with its own forces. The bidder or proposer must identify what portions of the contract will be self-performed and what portions of the contract will be opened to solicitation of bids, proposals and quotes from MBE and WBEs. All portions of the contract not self-performed must be solicited for MBE and WBE participation. The ability or desire of a bidder or proposer to perform the work of a contract with its own forces does not relieve the bidder or proposer of the responsibility to meet the project goal or demonstrate good faith efforts to do so.
- (4) The bidder or proposer, consistent with industry practice, must provide MBEs and WBEs at a clearly stated location with timely, adequate access to and information about the plans, specifications, and requirements of the contract, including

EXHIBIT C

bonding and insurance requirements, if any, to assist them in responding to a solicitation.

- (5) The bidder or proposer must negotiate in good faith with interested MBEs and WBEs and provide written documentation of such negotiation with each such MBE or WBE.
- (6) For each MBE or WBE which contacted the bidder or proposer or which the bidder or proposer contacted or attempted to subcontract or joint venture with, consistent with industry practice, the bidder or proposer must supply a statement giving the reasons why the bidder or proposer and the MBE or WBE did not succeed in negotiating a subcontracting, supplier, manufacturer, manufacturer's representative, broker or joint venture agreement, as applicable.
- (7) The bidder or proposer must provide verification that it rejected each non-utilized MBE and WBE because the MBE or WBE did not submit the lowest bid or it was not qualified. Such verification shall include a verified statement of the amounts of all bids received from potential or utilized subcontractors, suppliers, manufacturers, manufacturer's representatives, brokers or joint venturers on the contract, whether or not they are MBEs or WBEs. In making such a determination of not being qualified, the bidder or proposer shall be guided by the definition of qualified in section 28-54(42), but evidence of lack of qualification must be based on factors other than solely the amount of the MBE's or WBE's bid. For each MBE or WBE found not to be qualified by the bidder or proposer, the verification shall include a statement giving the bidder's or proposer's reasons for its conclusion. A bidder's or proposer's industry standing or group memberships may not be the cause of rejection of an MBE or WBE. A bidder or proposer may not reject an MBE or WBE as being unqualified without sound reasons based on a reasonably thorough investigation and assessment of the MBE's or WBE's capabilities and expertise.
- (8) If requested by a solicited MBE or WBE, the bidder or proposer must make reasonable efforts to assist interested MBEs and WBEs in obtaining bonding, lines of credit, or insurance as required by the city or by the bidder or proposer, provided that the bidder or proposer need not provide financial assistance toward this effort.
- (9) If requested by a solicited MBE or WBE, the bidder or proposer must make reasonable efforts to assist interested MBEs and WBEs in obtaining necessary and competitively priced equipment, supplies, materials, or related assistance or services for performance under the contract, provided that the bidder or proposer need not provide financial assistance toward this effort.
- (10) The bidder or proposer must use the DSBO MBE/WBE directories to identify, recruit, and place MBEs and WBEs.

Sec. 28-75. Potential violations during contract performance.

(c) The following modified good faith requirements shall apply to sections 28-72 and 28-73. In the event that a contractor or consultant must add or replace an MBE or WBE subcontractor,

EXHIBIT C

subconsultant, joint venturer, supplier, manufacturer, manufacturer's representative or broker or in the event that a new scope of work is added to the ongoing contract, and the contractor or consultant in such event is in non-compliance with maintenance of the original project goal upon which the contract was awarded, due to failure to utilize additional MBEs or WBEs, the following modified good faith efforts must be completed. Failure of a contractor or consultant to show good faith efforts as to any one (1) of the following categories shall render its overall good faith efforts showing insufficient; and its contract performance in non-compliance with this division 3.

- (1) Verification in writing to the DSBO of the contractor's or consultant's intention to terminate or replace an MBE or WBE originally identified for participation in the bid, proposal or competitive selection process proposal upon which the contract was awarded. The reason for the termination or replacement must be stated and the type of work or services must be identified.
- (2) Verification that the contractor or consultant used the most current MBE and WBE directory from the DSBO in order to contact MBEs and WBEs that are certified in the applicable area of work or supply at the time of the modified good faith effort.
- (3) Verification of efforts to contact appropriate MBEs and WBEs within the same identified subcontractor, subconsultant, joint venturer, supplier, manufacturer, manufacturer's representative or broker area must be documented. Facsimile transmission, e-mail and telephone communication will be acceptable. The director may verify such contacts as he deems appropriate.
- (4) Documentation of the modified good faith efforts must be submitted to the DSBO prior to the payment to the contractor or consultant of the next progress or other partial payment or fund release under the contract.

Exhibit D

Equal Employment Opportunity Provisions

RULES AND REGULATIONS REGARDING EQUAL EMPLOYMENT OPPORTUNITY

Promulgated and adopted by the Manager of Public Works pursuant to and by authority of Article III, Division 2, Chapter 28 of the Revised Municipal Code of the City and County of Denver, and for the purpose of insuring that contractors, subcontractors and suppliers soliciting and receiving compensation for contract work from or through the City and County of Denver provide equal opportunity in employment without regard to race, color, creed, sex, national origin, age, religion, marital status, political opinion or affiliation or mental or physical handicap and meet certain requirements for the hiring, training, promotion, and treatment during employment of members of ethnic groups subject to differential treatment, including persons of African descent (Black), Spanish-surnamed (Hispanic), Asian-American and American Indian Groups.

RULE I - DEFINITIONS

- A. "City" means the City and County of Denver.
- B. "Manager" shall mean the Manager of Public Works for the City and County of Denver.
- C. "Contract" means a contract entered into with the City and County of Denver, financed in whole or in part by local resources or funds of the City and County of Denver, for the construction of any public building or prosecution or completion of any public work.
- D. "Contractor" means the original party to a contract with the City and County of Denver, also referred to as the "general" or "prime" contractor.
- E. "Director" means the Director of the Division of Small Business Opportunity.
- F. "Subcontractor" means any person, company, association, partnership, corporation, or other entity, which assumes by subordinate agreement some or all of the obligations of the general or prime contractor.
- G. The phrase "Bidding Specifications" as used in Article III, Division 2 of Chapter 28 of the Revised Municipal Code shall include BID CONDITION, INVITATION TO BID, and NOTICE OF PROPOSAL.
- H. "Affirmative Action Program" means a set of specific and result-oriented procedures or steps to which a contractor commits himself to apply every good faith effort to employ members of ethnic minority groups, to include persons of African descent (Black), Spanish surnamed (Hispanic), Asian-American, American Indians, and persons with mental or physical handicap.
- I. "Division of Small Business Opportunity" means the City agency established pursuant to Article III, Division 1 of Chapter 28 of the Denver Revised Municipal Code.

RULE II - NOTICE OF HEARING

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When results of conciliation efforts are unsatisfactory to the Manager and he is informed in accordance with Article III, Division 2 of Chapter 28 of the Revised Municipal code that a contractor or subcontractor has apparently failed to meet affirmative action and equal employment opportunity requirements after a reasonable period of notice to correct deficiencies, the Manager will, prior to imposition of any sanctions, afford the general contractor a hearing in order to determine whether the contractor or his subcontractors have failed to comply with the affirmative action and equal employment opportunity requirements of Article III, Division 2 of Chapter 28 of the Revised Municipal Code or of the contract. Written notice of such hearing shall be delivered personally or sent by certified mail, return receipt requested, to the contractor and to any subcontractor involved, at least ten (10) days prior to the date scheduled for the hearing.

RULE III - HEARING

- A. Contractors will appear at hearings and may be represented by counsel, and may present testimony orally and other evidence.
- B. Hearings shall be conducted by one or more hearing examiners designated as such by the Manager.
- C. The Director of the Division of Small Business Opportunity may participate in hearings as a witness.
- D. Hearings shall be held at the place specified in the notice of hearing.
- E. All oral testimony shall be given under oath or affirmation and a record of such proceedings shall be made.
- F. All hearings shall be open to the public.
- G. The hearing officer shall make recommendations to the Manager who shall make a final decision.

REGULATIONS

REGULATION NO. 1 - ORDINANCE:

The Rules and Regulations of the Manager shall be inserted in the bidding specifications for every contract for which bidding is required.

REGULATION NO. 2 - EXEMPTIONS:

Each contract and subcontract, regardless of the dollar amount, shall be subject to affirmative action requirements unless specifically exempted in writing individually by the Manager. Exemptions apply only to "affirmative action" in equal employment opportunity, and are not to be construed as condonation in any manner of "discrimination" or "discriminatory practices" in employment because of race, color, creed, sex, age, national origin, religion, marital status, political opinion or mental or physical handicap.

REGULATION NO. 3 - DIRECTOR OF CONTRACT COMPLIANCE:

The Director of the Division of Small Business Opportunity shall perform the duties assigned to such official by Article III, Division 2 Chapter 28 of the Revised Municipal Code and by the Manager. (1) The Director of the Division of Small Business Opportunity or designated representatives shall inform bidders and contractors of affirmative action procedures, programs, and goals in accordance with the Ordinance at pre-bid and pre-construction conference; (2) make regular on-site inspections; (3) supply contractors and subcontractors with report forms to be completed by them when requested, and furnished to the Director of the Division of Small Business Opportunity; and (4) review payroll records, employment records and practices of general contractors and their subcontractors and suppliers during the performance of any contract. The Director of the Division of Small Business Opportunity shall promptly report apparent affirmative action deficiencies to the Manager.

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REGULATION NO. 4 - GOALS AND TIMETABLES:

In general, goals and timetables should take into account anticipated vacancies and the availability of skills in the market place from which employees should be drawn. In addition, where discrimination in employment by a general contractor or any of his subcontractors is indicated, a corrective action program will take into account the need by the general contractor and his subcontractors to correct past discriminatory practices and reach goals of minority manpower utilization on a timely basis through such recruiting and advertising efforts as are necessary and appropriate.

REGULATION NO. 5 - AWARD OF CONTRACTS:

It shall be the responsibility of the Director of the Division of Small Business Opportunity to determine the affirmative action capability of bidders, contractors and subcontractors and to recommend to the Manager the award of contracts to those bidders, contractors and subcontractors and suppliers who demonstrate the ability and willingness to comply with the terms of their contract.

REGULATION NO. 6 - PUBLICATION AND DUPLICATION:

Copies of these Rules and Regulations as amended by the Manager from time to time, shall as soon as practicable and after Notice being published will be made a part of all City Contracts.

REGULATION NO. 7 - NOTICE TO PROCEED:

Prior to issuance of the Notice to Proceed, a sign-off will be required of the Director of the Division of Small Business Opportunity or his designee.

REGULATION NO. 8 - CONTRACTS WITH SUBCONTRACTORS:

To the greatest extent possible, the contractor shall make a good faith effort to contract with minority contractors, subcontractors and suppliers for services and supplies by taking affirmative actions, which include but are not limited to the following:

1. Advertise invitations for subcontractor bids in minority community news media.
2. Contact minority contractor organizations for referral of prospective subcontractors.
3. Purchase materials and supplies from minority material suppliers.

REGULATION NO. 9 - AGENCY REFERRALS:

It shall be no excuse that the union with which the contractor or subcontractor has an agreement providing for referral, exclusive or otherwise, failed to refer minority employees.

REGULATION NO. 10 - CLAUSES:

The Manager shall include the appropriate clauses in every contract and the contractor shall cause to be inserted in every subcontract the appropriate clauses:

1. APPENDIX A: City and County of Denver Equal Opportunity Clause - ALL CONTRACTS funded only with City and County of Denver monies.
2. APPENDIX B: Equal Opportunity Clause (11246) - ALL FEDERAL ASSISTED.
3. APPENDIX C: Section 3 - Assurance of Compliance - HUD ASSISTED PROJECTS.
4. APPENDIX D: Section 3 - Clause - HUD ASSISTED PROJECTS.

All amendments to the appendices shall be included by reference.

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REGULATION NO. 11 - SHOW CAUSE NOTICES:

When the Manager has reasonable cause to believe that a contractor has violated Article III, Division 2 of Chapter 28 of the Denver Revised Municipal Code, he may issue a notice requiring the contractor to show cause, within fifteen (15) days why enforcement procedures, or other appropriate action to insure compliance, should not be instituted.

REGULATION NO. 12 - BID CONDITIONS - AFFIRMATIVE ACTION REQUIREMENTS - EQUAL EMPLOYMENT OPPORTUNITY:

1. APPENDIX E: The Bid Conditions - Affirmative Action Requirements - Equal Employment Opportunity as amended and published by the U.S. Department of Labor Employment Standards Administration, Office of Federal Contract Compliance, shall be inserted verbatim for bidding specification for every non-exempt contract involving the use of Federal funds.
2. APPENDIX F: The Bid Conditions - Affirmative Action Requirements - Equal Employment Opportunity as published by the Department of Public Works, City and County of Denver, shall be inserted verbatim as bidding specifications for every non-exempt contract using City funds.

Exhibit D

CITY AND COUNTY OF DENVER DEPARTMENT OF PUBLIC WORKS

APPENDIX A

CITY AND COUNTY OF DENVER EQUAL OPPORTUNITY CLAUSE - ALL CONTRACTS

1. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, sex, age, national origin, religion, marital status, political opinion or affiliation, or mental or physical handicap. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, creed, color, sex, age, national origin, religion, marital status, political opinion or affiliation, or mental or physical handicap. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, sex, age, national origin, religion, marital status, political opinion or affiliation, or mental or physical handicap.
3. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided, advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. Each Contractor will comply with all provisions of Article III, Division 2 of Chapter 28 of the Revised Municipal Code, and the rules, regulations, and relevant orders of the Manager and the Director.
5. The Contractor will furnish all information and reports required by Article III, Division 2 of Chapter 28 of the Revised Municipal Code, and by rules, regulations and orders of the Manager and Director or pursuant thereto, and will permit access to his books, records, and accounts by the Manager, Director, or their designee for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
6. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further City contracts in accordance with procedures authorized in Article III, Division 2, Chapter 28 of the Revised Municipal Code, or by rules, regulations, or order of the Manager.
7. The Contractor will include Regulation 12, Paragraph 2 and the provisions of paragraphs (1) through (6) in every subcontract of purchase order unless exempted by rules, regulations, or orders of the Manager issued pursuant to Article III, Division 2, Chapter 28 of the Revised Municipal

Exhibit D

Code, so that such provisions will be binding on each subcontractor or supplier. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance.

The applicant further agrees to be bound by the above equal opportunity clauses with respect to its own employment practices when it participates in City contracts. The Contractor agrees to assist and cooperate actively with the Manager and the Director in obtaining compliance of subcontractors and suppliers with the equal opportunity clause and the rules, regulations and relevant orders of the Manager, and will furnish the Manager and the Director such information as they may require for the supervision of compliance, and will otherwise assist the Manager and Director in the discharge of the City's primary responsibility for securing compliance. The Contractor further agrees to refrain from entering into any contract or contract modification subject to Article III, Division 2 of Chapter 28 of the Revised Municipal Code with a contractor debarred from, or who has not demonstrated eligibility for, City contracts.

The Contractor will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the Manager and Director. In addition, the Contractor agrees that failure or refusal to comply with these undertakings the Manager may take any or all of the following actions:

- A. Cancellation, termination, or suspension in whole or in part of this contract.
- B. Refrain from extending any further assistance to the applicant under the program with respect to which the failure occurred until satisfactory assurance of future compliance has been received from such applicant.
- C. Refer the case to the City Attorney for appropriate legal proceedings.

SUBCONTRACTS: Each prime Contractor or Subcontractor shall include the equal opportunity clause in each of its subcontracts.

Exhibit D

**CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS**

APPENDIX F

AFFIRMATIVE ACTION REQUIREMENTS

EQUAL EMPLOYMENT OPPORTUNITY

For All Non-Exempt Construction Contracts to Be Awarded by the
City and County of Denver, Department of Public Works.

NOTICE

EACH BIDDER, CONTRACTOR OR SUBCONTRACTOR (HEREINAFTER THE CONTRACTOR) MUST FULLY COMPLY WITH THE REQUIREMENTS OF THESE BID CONDITIONS AS TO EACH CONSTRUCTION TRADE IT INTENDS TO USE ON THIS CONSTRUCTION CONTRACT, AND ALL OTHER CONSTRUCTION WORK (BOTH CITY AND NON-CITY) IN THE DENVER AREA DURING THE PERFORMANCE OF THIS CONTRACT OR SUBCONTRACT. THE CONTRACTOR COMMITS ITSELF TO THE GOALS FOR MINORITY MANPOWER UTILIZATION, AS APPLICABLE, AND ALL OTHER REQUIREMENTS, TERMS AND CONDITION OF THESE BID CONDITIONS BY SUBMITTING A PROPERLY SIGNED BID.

THE CONTRACTOR SHALL APPOINT A COMPANY EXECUTIVE TO ASSUME THE RESPONSIBILITY FOR THE IMPLEMENTATION OF THE REQUIREMENTS, TERMS AND CONDITIONS OF THESE BID CONDITIONS.

/s/ _____

Manager of Public Works
City and County of Denver

Exhibit D

A. **REQUIREMENTS - AN AFFIRMATIVE ACTION PLAN:**

Contractors shall be subject to the provisions and requirements of these bid conditions including the goals and timetables for minority* and female utilization, and specific affirmative action steps set forth by the Division of Small Business Opportunity (DSBO). The contractor's commitment to the goals for minority, and female utilization as required constitutes a commitment that it will make every good faith effort to meet such goals.

1. **GOALS AND TIMETABLES:**

The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade are as follows:

GOALS FOR MINORITY PARTICIPATION FOR EACH TRADE	GOALS FOR FEMALE PARTICIPATION FOR EACH TRADE
From January 1, 1982 to Until Further Notice	From January 1, 1982 to Until Further Notice
21.7% - 23.5%	6.9%

The goals for minority and female utilization above are expressed in terms of hours of training and employment as a proportion of the total number of hours to be worked by the contractor's aggregate workforce, which includes all supervisory personnel, in each trade, on all projects for the City and County of Denver during the performance of its contract (i.e., The period beginning with the first day of work on the City and County of Denver funded construction contract and ending with the last day of work).

The hours of minority and female employment and training must be substantially uniform throughout the length of the contract in each trade and minorities and females must be employed evenly on each of a contractor's projects. Therefore, the transfer of minority or female employees from contractor to contractor or from project to project for the purpose of meeting the contractor's goals shall be a violation of these Bid Conditions.

If the Contractor counts the nonworking hours of apprentices they must be employed by the Contractor during the training period; the Contractor must have made a commitment to employ apprentices at the completion of their training subject to the availability of employment opportunities; and the apprentices must be trained pursuant to training programs approved by the Bureau of Apprenticeship and Training.

* "Minority" is defined as including, Blacks, Spanish Surname Americans, Asian Americans, and American Indians, and includes both men and minority women.

2. **SPECIFIC AFFIRMATIVE ACTION STEPS:**

No contractor shall be found to be in noncompliance solely on account of its failure to meet its goals, but will be given an opportunity to demonstrate that the contractor has instituted all the specific affirmative action steps specified and has made every good faith effort to make these steps work toward the attainment of its goals within the timetables, all to the purpose of expanding minority and female utilization in its aggregate workforce. A contractor, who fails to comply with its obligation under the Equal Opportunity Clause of its contract and fails to achieve its commitments to the goals for minority and female

Exhibit D

utilization has the burden of proving that it has engaged in an Affirmative Action Program directed at increasing minority and female utilization and that such efforts were at least as extensive and as specific as the following:

- a. The Contractor should have notified minority and female organizations when employment opportunities were available and should have maintained records of the organization's response.
- b. The Contractor should have maintained a file of the names and addresses of each minority and female referred to it by any individual or organization and what action was taken with respect to each such referred individual, and if the individual was not employed by the Contractor, the reasons. If such individual was sent to the union hiring hall for referral and not referred back by the union or if referred, not employed by the Contractor, the file should have documented this and their reasons.
- c. The Contractor should have promptly notified the Department of Public Works, and the Division of Small Business Opportunity when the union or unions with which the Contractor has collective bargaining agreements did not refer to the contractor a minority or female sent by the contractor, or when the Contractor has other information that the union referral process has impeded efforts to meet its goals.
- d. The Contractor should have disseminated its EEO policy within its organization by including it in any employee handbook or policy manual; by publicizing it in company newspapers and annual reports and by advertising such policy at reasonable intervals in union publications. The EEO policy should be further disseminated by conducting staff meetings to explain and discuss the policy; by posting of the policy; and by review of the policy with minority and female employees.
- e. The Contractor should have disseminated its EEO policy externally by informing and discussing it with all recruitment sources; by advertising in news media, specifically including minority and female news media; and by notifying and discussing it with all subcontractors.
- f. The Contractor should have made both specific and reasonably recurrent written and oral recruitment efforts. Such efforts should have been directed at minority and female organizations, schools with substantial minority and female enrollment, and minority and female recruitment and training organizations within the Contractor's recruitment area.
- g. The Contractor should have evidence available for inspection that all tests and other selection techniques used to select from among candidates for hire, transfer, promotion, training, or retention are being used in a manner that does not violate the OFCCP Testing Guidelines in 41 CFR Part 60-3.
- h. The Contractor should have made sure that seniority practices and job classifications do not have a discriminatory effect.

Exhibit D

- i. The Contractor should have made certain that all facilities are not segregated by race.
- j. The Contractor should have continually monitored all personnel activities to ensure that its EEO policy was being carried out including the evaluation of minority and female employees for promotional opportunities on a quarterly basis and the encouragement of such employees to seek those opportunities.
- k. The Contractor should have solicited bids for subcontracts from available minority and female subcontractors engaged in the trades covered by these Bid Conditions, including circulation of minority and female contractor associations.

NOTE: The Director and the Division of Small Business Opportunity will provide technical assistance on questions pertaining to minority and female recruitment sources, minority and female community organizations, and minority and female news media upon receipt of a request for assistance from a contractor.

3. NON - DISCRIMINATION:

In no event may a contractor utilize the goals and affirmative action steps required in such a manner as to cause or result in discrimination against any person on account of race, color, religion, sex, marital status, national origin, age, mental or physical handicap, political opinion or affiliation.

4. COMPLIANCE AND ENFORCEMENT:

In all cases, the compliance of a contractor will be determined in accordance with its obligations under the terms of these Bid Conditions. All contractors performing or to perform work on projects subject to these Bid Conditions hereby agree to inform their subcontractors in writing of their respective obligations under the terms and requirements of these Bid Conditions, including the provisions relating to goals of minority and female employment and training.

B. CONTRACTORS SUBJECT TO THESE BID CONDITIONS:

In regard to these Bid Conditions, if the Contractor meets the goals set forth therein or can demonstrate that it has made every good faith effort to meet these goals, the Contractor shall be presumed to be in compliance with Article III, Division 2 of Chapter 28 of the Revised Municipal Code, the implementing regulations and its obligations under these Bid Conditions. In the event, no formal sanctions or proceedings leading toward sanctions shall be instituted unless the contracting or administering agency otherwise determines that the contractor is violating the Equal Opportunity Clause.

- 1. Where the Office of Contract Compliance finds that a contractor failed to comply with the requirements of Article III, Division 2 of Chapter 28 of the Revised Municipal Code or the implementing regulations and the obligations under these Bid Conditions, and so informs the Manager, the Manager shall take such action and impose such sanctions, which include suspension, termination, cancellation, and debarment, as may be appropriate under the Ordinance and its regulations. When the Manager proceeds with such formal action it has the burden of proving that the Contractor has not met the goals contained in these Bid Conditions. The Contractor's failure to meet its goals shall shift to it the requirement to come forward with evidence to show that it has met the good faith requirements of these Bid Conditions.

Exhibit D

2. The pendency of such proceedings shall be taken into consideration by the Department of Public Works in determining whether such contractor can comply with the requirements of Article III, Division 2 of Chapter 28 of the Revised Municipal Code, and is therefore a "responsible prospective contractor".
3. The Division of Small Business Opportunity shall review the Contractor's employment practices during the performance of the contract. If the Division of Small Business Opportunity determines that the Contractor's Affirmative Action Plan is no longer an acceptable program, the Director shall notify the Manager.

C. OBLIGATIONS APPLICABLE TO CONTRACTORS:

It shall be no excuse that the union with which the Contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority or female employees. Discrimination in referral for employment, even if pursuant to provisions of a collective bargaining agreement, is prohibited by the National Labor Relations Act, as amended, Title VI of the Civil Rights Act of 1964, as amended, and Article III, Division 2 of Chapter 28 of the Revised Municipal Code. It is the policy of the Department of Public Works that contractors have a responsibility to provide equal employment opportunity, if they wish to participate in City and County of Denver contracts. To the extent they have delegated the responsibility for some of their employment practices to a labor organization and, as a result, are prevented from meeting their obligations pursuant to Article III, Division 2, Chapter 28 of the Revised Municipal Code, such Contractors cannot be considered to be in compliance with Article III, Division 2, Chapter 28 of the Revised Municipal Code, or its implementing rules and regulations.

D. GENERAL REQUIREMENTS:

Contractors are responsible for informing their subcontractors in writing regardless of tier, as to their respective obligations. Whenever a Contractor subcontracts a portion of work in any trade covered by these Bid Conditions, **it shall include these Bid Conditions in such subcontracts and each subcontractor shall be bound by these Bid Conditions to the full extent as if it were the prime contractor.** The Contractor shall not, however, be held accountable for the failure of its subcontractors to fulfill their obligations under these Bid Conditions. However, the prime contractor shall give notice to the Director of any refusal or failure of any subcontractor to fulfill the obligations under these Bid Conditions. A subcontractor's failure to comply will be treated in the same manner as such failure by a prime contractor.

1. Contractors hereby agree to refrain from entering into any contract or contract modification subject to Article III, Division 2, Chapter 28 of the Revised Municipal Code with a contractor debarred from, or who is determined not to be a "responsive" bidder for the City and County of Denver contracts pursuant to the Ordinance.
2. The Contractor shall carry out such sanctions and penalties for violation of these Bid Conditions and the Equal Opportunity Clause including suspension, termination and cancellation of existing subcontracts and debarment from future contracts as may be ordered by the Manager pursuant to Article III, Division 2, Chapter 28 of the Revised Municipal Code and its implementing regulations.
3. Nothing herein is intended to relieve any contractor during the term of its contract from compliance with Article III, Division 2, Chapter 28 of the Revised Municipal Code, and the Equal Opportunity Clause of its contract with respect to matters not covered in these Bid Conditions.

Exhibit D

4. Contractors must keep such records and file such reports relating to the provisions of these Bid Conditions as shall be required by the Office of Contract Compliance.
5. Requests for exemptions from these Bid Conditions must be made in writing, with justification, to the Manager of Public Works, 201 W. Colfax, Dept. 608, Denver, Colorado 80202, and shall be forwarded through and with the endorsement of the Director.

Exhibit E



Office of Human Resources
Denver's Human Resource Agency

201 W. Colfax, Department 412
Denver, CO 80202
p: 720.913.5751
f: 720.913.5720
www.denvergov.org/humanresources

TO: All Users of the City of Denver Prevailing Wage Schedules

FROM: Susan Keller, Human Resources Technician, Classification & Compensation

DATE: Wednesday, March 14, 2018

SUBJECT: Latest Change to Prevailing Wage Schedules

Please be advised, prevailing wage rates for some building, heavy, highway, and residential construction trades have not been updated by the United States Department of Labor (DOL) since March 1, 2002. The Career Service Board, in their meeting held on April 21, 2011, approved the use of the attached supplemental wage rates until prevailing wage rates for these classifications of work are again published by the United States Department of Labor in accordance with the Davis-Bacon Act.

The effective date for this publication will be **Friday, March 2, 2018** and applies to the City and County of Denver for **HEAVY CONSTRUCTION PROJECTS** in accordance with the Denver Revised Municipal Code, Section 20-76(c).

General Wage Decision No. CO180012
Superseded General Decision No. CO20170012
Modification No. 4
Publication Date: 03/02/2018
(7 pages)

Unless otherwise specified in this document, apprentices shall be permitted only if they are employed pursuant to, and individually registered in, a bona fide apprenticeship program registered with the U.S. Department of Labor (DOL). The employer and the individual apprentice must be registered in a program, which has received prior approval, by the DOL. Any employer, who employs an apprentice and is found to be in violation of this provision, shall be required to pay said apprentice the full journeyman scale.

Attachments as listed above.

Exhibit E

General Decision Number: CO180012 03/02/2018 CO12

Superseded General Decision Number: CO20170012

State: Colorado

Construction Type: Heavy

Counties: Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, El Paso, Jefferson, Larimer, Mesa, Pueblo and Weld Counties in Colorado.

HEAVY CONSTRUCTION PROJECTS

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

Modification Number	Publication Date
0	01/05/2018
1	01/12/2018
2	02/02/2018
3	02/09/2018
4	03/02/2018

ASBE0028-001 07/01/2017

	Rates	Fringes
Asbestos Workers/Insulator (Includes application of all insulating materials, protective coverings, coatings and finishings to all types of mechanical systems).....	\$ 30.73	14.23

BRCO0007-004 01/01/2018

ADAMS, ARAPAHOE, BOULDER, BROOMFIELD, DENVER, DOUGLAS AND
JEFFERSON COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 27.98	8.53

Exhibit E

BRCO0007-006 05/01/2017

EL PASO AND PUEBLO COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 25.32	9.90

ELEC0012-004 01/01/2018

PUEBLO COUNTY

	Rates	Fringes
ELECTRICIAN		
Electrical contract over		
\$1,000,000.....	\$ 27.95	11.40+3%
Electrical contract under		
\$1,000,000.....	\$ 24.85	11.40+3%

ELEC0068-001 01/01/2018

ADAMS, ARAPAHOE, BOULDER, BROOMFIELD, DENVER, DOUGLAS,
JEFFERSON, LARIMER, AND WELD COUNTIES

	Rates	Fringes
ELECTRICIAN.....	\$ 34.70	15.07

ELEC0111-001 09/01/2017

	Rates	Fringes
Line Construction:		
Groundman.....	\$ 25.68	25.25%+\$5.75
Line Equipment Operator.....	\$ 31.35	25.25% + \$5.75
Lineman and Welder.....	\$ 44.92	25.25%+\$5.75

ELEC0113-002 01/01/2018

EL PASO COUNTY

	Rates	Fringes
ELECTRICIAN.....	\$ 31.00	15.48

ELEC0969-002 06/01/2015

MESA COUNTY

	Rates	Fringes
ELECTRICIAN.....	\$ 24.00	7.92

ENGI0009-001 05/01/2017

	Rates	Fringes
Power equipment operators:		
Blade: Finish.....	\$ 27.92	10.10
Blade: Rough.....	\$ 27.60	10.10
Bulldozer.....	\$ 27.60	10.10

Exhibit E

Cranes: 50 tons and under...	\$ 27.75	10.10
Cranes: 51 to 90 tons.....	\$ 27.92	10.10
Cranes: 91 to 140 tons.....	\$ 28.55	10.10
Cranes: 141 tons and over...	\$ 29.82	10.10
Forklift.....	\$ 27.22	10.10
Mechanic.....	\$ 28.08	10.10
Oiler.....	\$ 26.84	10.10
Scraper: Single bowl under 40 cubic yards.....	\$ 27.75	10.10
Scraper: Single bowl, including pups 40 cubic yards and over and tandem bowls.....	\$ 27.92	10.10
Trackhoe.....	\$ 27.75	10.10

* IRON0024-003 11/01/2017

	Rates	Fringes
Ironworkers:.....	\$ 27.45	27.76
Structural		

LABO0086-001 05/01/2009

	Rates	Fringes
Laborers:		
Pipelayer.....	\$ 18.68	6.78

PLUM0003-005 06/01/2017

ADAMS, ARAPAHOE, BOULDER, BROOMFIELD, DENVER, DOUGLAS,
JEFFERSON, LARIMER AND WELD COUNTIES

	Rates	Fringes
PLUMBER.....	\$ 39.08	16.44

PLUM0058-002 07/01/2017

EL PASO COUNTY

	Rates	Fringes
Plumbers and Pipefitters.....	\$ 36.50	14.10

PLUM0058-008 07/01/2017

PUEBLO COUNTY

	Rates	Fringes
Plumbers and Pipefitters.....	\$ 36.50	14.10

PLUM0145-002 07/01/2016

MESA COUNTY

	Rates	Fringes
Plumbers and Pipefitters.....	\$ 35.17	11.70

Exhibit E

PLUM0208-004 06/01/2016

ADAMS, ARAPAHOE, BOULDER, BROOMFIELD, DENVER, DOUGLAS,
JEFFERSON, LARIMER AND WELD COUNTIES

	Rates	Fringes
PIPEFITTER.....	\$ 37.10	16.62

SHEE0009-002 07/01/2017

	Rates	Fringes
Sheet metal worker.....	\$ 33.26	16.61

TEAM0455-002 07/01/2017

	Rates	Fringes
Truck drivers:		
Pickup.....	\$ 20.91	4.22
Tandem/Semi and Water.....	\$ 21.54	4.22

SUCO2001-006 12/20/2001

	Rates	Fringes
BOILERMAKER.....	\$ 17.60	
Carpenters:		
Form Building and Setting...	\$ 16.97	2.74
All Other Work.....	\$ 15.14	3.37
Cement Mason/Concrete Finisher...	\$ 17.31	2.85
IRONWORKER, REINFORCING.....	\$ 18.83	3.90
Laborers:		
Common.....	\$ 11.22	2.92
Flagger.....	\$ 8.91	3.80
Landscape.....	\$ 12.56	3.21
Painters:		
Brush, Roller & Spray.....	\$ 15.81	3.26
Power equipment operators:		
Backhoe.....	\$ 16.36	2.48
Front End Loader.....	\$ 17.24	3.23
Skid Loader.....	\$ 15.37	4.41

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

Exhibit E
Office of Human Resources
Supplemental rates
(Specific to the Denver Projects)
(Supp #74, Date: 02-03-2012)

Classification		Base	Fringe
Ironworker	Ornamental	\$24.80	\$10.03
Laborer	Group 1	\$18.18	\$8.27
	Group 2	\$21.59	\$8.61
Laborer (Janitor)	Janitor/Yardmen	\$17.68	\$8.22
Laborer (Asbestos)	Removal of Asbestos	\$21.03	\$8.55
Laborer (Tunnel)	Group 1	\$18.53	\$8.30
	Group 2	\$18.63	\$8.31
	Group 3	\$19.73	\$8.42
	Group 4	\$21.59	\$8.61
	Group 5	\$19.68	\$8.42
Line Construction	Lineman, Gas Fitter/Welder	\$36.88	\$9.55
	Line Eq Operator/Line Truck Crew	\$25.74	\$8.09
Millwright		\$28.00	\$10.00
Power Equipment Operator	Group 1	\$22.97	\$10.60
	Group 2	\$23.32	\$10.63
	Group 3	\$23.67	\$10.67
	Group 4	\$23.82	\$10.68
	Group 5	\$23.97	\$10.70
	Group 6	\$24.12	\$10.71
	Group 7	\$24.88	\$10.79
Power Equipment Operator (Tunnels above and below ground, shafts and raises):	Group 1	\$25.12	\$10.81
	Group 2	\$25.47	\$10.85
	Group 3	\$25.57	\$10.86
	Group 4	\$25.82	\$10.88
	Group 5	\$25.97	\$10.90
	Group 6	\$26.12	\$10.91
	Group 7	\$26.37	\$10.94
Truck Driver	Group 1	\$18.42	\$10.00
	Group 2	\$19.14	\$10.07
	Group 3	\$19.48	\$10.11
	Group 4	\$20.01	\$10.16
	Group 5	\$20.66	\$10.23
	Group 6	\$21.46	\$10.31

- **Ironworker – Ornamental**
 - Heavy Ornamental is not combined with Ironworker Structural
 - Install pedestrian and ornamental railings on bridges
 - Install metal hand rails
 - Install wrought iron fences, whether they are welded together or bolted together

Exhibit E

- **Laborer**

- **Group 1** –Erosion Control, Dowel Bars; Fence Erectors; Gabion Basket and Reno mattresses; Signaling, Metal Mesh; Stake Caser; Traffic Control Devices; Tie Bars and Chairs in Concrete; Paving; Waterproofing Concrete; Air, Gas, Hydraulic Tools and Electrical Tool Operators; Barco Hammers; Cutting Torches; drill; diamond and core drills; Core, diamond, air track including but not limited to; Joy, Mustang, PR-143, 220 Gardner-Denver, Hydrosonic, and water blaster operator; Chuck Tender; Electric hammers; Jackhammers; Hydraulic Jacks; Tampers; Air Tampers; Automatic Concrete Power Curbing Machines; Concrete Processing Material; Concrete Tender; Operators of concrete saws on pavement (other than gangsaws); Power operated Concrete Buggies; Hot Asphalt Labor; Asphalt Curb Machines; Paving Breakers; Transverse Concrete Conveyor Operator; Cofferdams; Boxtenders; Caisson 8' to 12'; Caisson Over 12'; Jackhammer Operators in Caissons over 12'; Labor applicable to Pipe coating or Wrapping; Pipe Wrappers, Plant and Yard; Relining Pipe; Hydroliner (a plastic may be used to waterproof); Pipelayer on Underground Bores; Sewer, Water, Gas, Oil Conduit; Enamalers on Pipe, inside and out, Mechanical Grouters; Monitors; Jeep Holiday Detector Men; Pump Operators; Rakers; Vibrators; Hydro- broom, Mixer Man; Gunnite Nozzlemen; Shotcrete Operator; and chain saws, gas and electric; Sand Blaster; Licensed Powdermen; Powdermen and Blaster; Siphons; Signalmen; Dumpman/spotter; Grade Checker.
- **Group 2** - Plug and galleys in dams; Scalers; any work on or off Bridges 40' above the ground performed by Laborers working from a Bos'n Chair, Swing Stage, Life Belt, or Block and Tackle as a safety requirement.

- **Laborer - Asbestos**

- Abatement of asbestos or remediation of hazardous materials inside or outside of a building
- Asbestos Workers and Insulators do not perform abatement or remediation work

- **Laborer - Tunnel**

- **Group 1** - Outside Laborer - Above ground
- **Group 2** - Minimum Tunnel Laborer, Dry Houseman
- **Group 3** - Cable or Hose Tenders, Chuck Tenders, Concrete Laborers, Dumpmen, Whirley Pump Operators
- **Group 4** - Tenders on Shotcrete, Gunniting and Sand Blasting; Tenders, core and Diamond Drills; Pot Tenders
- **Group 5** - Collapsible Form Movers and Setters; Miners; Machine Men and Bit Grinders; Nippers; Powdermen and Blasters; Reinforcing Steel Setters; Timbermen (steel or wood tunnel support, including the placement of sheeting when required); and all Cutting and Welding that is incidental to the Miner's work; Tunnel Liner Plate Setters; Vibrator Men, Internal and External; Unloading, stopping and starting of Moran Agitator Cars; Diamond and Core Drill Operators; Shotcrete operator; Gunnite Nozzlemen; Sand Blaster; Pump Concrete Placement Men.

- **Power Equipment Operator (Tunnels above and below ground, shafts, and raises)**

- Group 1 - Brakeman
- Group 2 - Motorman
- Group 3 - Compressor
- Group 4 - Air Tractors; Grout Machine; Gunnite Machine; Jumbo Form
- Group 5 - Concrete Placement Pumps; Mucking Machines and Front End Loaders, Underground, Slusher; Mine Hoist Operator; Mechanic
- Group 6 - Mechanic Welder
- Group 7 – Mole

- **Power Equipment Operator**

NOTE: Any equipment listed below being used in tunnel work, below or above ground shall be paid no less than \$2.00 per hour above the listed wage rates.

- **Group 1** - Air compressor, brakeman, drill operator - smaller than Watson 2500 and similar, operators of 5 or more light plants, welding machines, generators, single unit conveyor, pumps, vacuum well point system, tractor, under 70 hp with or without attachments compressors, 360 C.F.M. or less.

Exhibit E

- **Group 2** - Conveyor, handling **building** materials, ditch witch and similar trenching machine, haulage motor man, pugmill, portable screening plant with or without a spray bar, screening plants, with classifier.
- **Group 3** - Asphalt screed, asphalt plant, backfiller, bituminous spreader or laydown machine; cableway signalman, caisson drill, William MF, similar or larger; C.M.I. and similar, concrete batching plants, concrete finish machine, concrete gang saw on concrete paving, concrete mixer, less than 1 yd., concrete placement pumps, under 8 inches, distributors, bituminous surfaces dozer, drill, diamond or core, drill rigs, rotary, churn, or cable tool, elevating graders, elevator operator, equipment, lubricating and service engineer, grout machine, gunnite machine, hoist, 1 drum, horizontal directional drill operator, sandblasting machine, single unit portable crusher, with or without washer, tie tamper, wheel mounted, tractor, 70 hp and over with or without attachments, trenching machine operator, winch on truck.
- **Group 4** - Cable operated power shovels, draglines, articulated truck operator, clamshells, and backhoes, 5 cubic yards and under, concrete mixer over 1 cubic yard, concrete paver 34E or similar, concrete placement pumps, 8 inches and over, grade checker, hoist, 2 drums, hydraulic backhoe, 3/4 yds and over, loader, over 6 cubic yards, mechanic, mixer mobile, multiple unit portable crusher, with or without washer; pile driver, tractor with side boom, roto- mill and similar, welder.
- **Group 5** - Cable operated power shovels, draglines, clamshells and backhoes over 5 cubic yards, caisson drill Watson 2500 similar or larger, hoist 3 drum or more, mechanic – welder (heavy-duty).
- **Group 6** - Cableway, derrick, quad nine push unit, wheel excavator, belt or elevating loader
- **Group 7** - tower cranes all types
- **Truck Driver**
 - **Group 1** - Sweeper Truck, Flat Rack Single Axle and Manhaul, Shuttle Truck or Bus
 - **Group 2** - Dump Truck Driver to and including 6 cubic yards, Dump Truck Driver over 6 cubic yards to and including 14 cubic yards, Straddle Truck Driver, Liquid and Bulk Tankers Single Axle, Euclid Electric or Similar, Multipurpose Truck Specialty and Hoisting
 - **Group 3** - Truck Driver Snow Plow
 - **Group 4** - Cement Mixer Agitator Truck over 10 cubic yards to and including 15 cubic yards
- Trade classification workers cannot be classified as common laborers for performing incidental cleanup from the installation of their craft. Common Laborers perform final cleanup of the entire jobsite.
- Go to <http://www.denvergov.org/Auditor> to view the Prevailing Wage Clarification Document for a list of complete classifications used.

Payment and Performance Bond

Bond No. 2264138

**CITY AND COUNTY OF DENVER
DEPARTMENT OF PUBLIC WORKS
PERFORMANCE AND PAYMENT BOND**

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned **SPECTRUM GENERAL CONTRACTORS, INC.**, a corporation organized and existing under and by virtue of the laws of the State of **Colorado**, hereafter referred to as the "Contractor", and **North American Specialty Insurance Company**, a corporation organized and existing under and by virtue of the laws of the State of New Hampshire , and authorized to transact business in the State of Colorado, as Surety, are held and firmly bound unto the CITY AND COUNTY OF DENVER, a municipal corporation of the State of Colorado, hereinafter referred to as the "City", in the penal sum of **One Million Nine Hundred Seven Thousand Three Hundred Twenty-Five Dollars and Forty-Four Cents (\$1,907,325.44)**, lawful money of the United States of America, for the payment of which sum, well and truly to be made, we bind ourselves and our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents;

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH THAT:

WHEREAS, the above bounden Contractor has entered into a written contract with the aforesaid City for furnishing all labor and tools, supplies, equipment, superintendence, materials and everything necessary for and required to do, perform and complete the construction of **CONTRACT NO. 201946720, SULLIVAN GATEWAY EAST**, Denver, Colorado, and has bound itself to complete the project within the time or times specified or pay liquidated damages, all as designated, defined and described in the said Contract and Conditions thereof, and in accordance with the Plans and Technical Specifications therefore, a copy of said Contract being made a part hereof;

NOW, THEREFORE, if the said Contractor shall and will, in all particulars well and truly and faithfully observe, perform and abide by each and every Covenant, Condition and part of said Contract, and the Conditions, Technical Specifications, Plans, and other Contract Documents thereto attached, or by reference made a part thereof and any alterations in and additions thereto, according to the true intent and meaning in such case, then this obligation shall be and become null and void; otherwise, it shall remain in full force and effect;

PROVIDED FURTHER, that if the said Contractor shall satisfy all claims and demands incurred by the Contractor in the performance of said Contract, and shall fully indemnify and save harmless the City from all damages, claims, demands, expense and charge of every kind (including claims of patent infringement) arising from any act, omission, or neglect of said Contractor, its agents, or employees with relation to said work; and shall fully reimburse and repay to the City all costs, damages, and expenses which it may incur in making good any default based upon the failure of the Contractor to fulfill its obligation to furnish maintenance, repairs or replacements for the full guarantee period provided in the Contract Documents, then this obligation shall be null and void; otherwise it shall remain in full force and effect;

PROVIDED FURTHER, that if said Contractor shall at all times promptly make payments of all amounts lawfully due to all persons supplying or furnishing it or its subcontractors with labor and materials, rental machinery, tools or equipment used or performed in the prosecution of work provided for in the above Contract and that if the Contractor will indemnify and save harmless the City for the extent of any and all payments in connection with the carrying out of such Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect;

Exhibit F

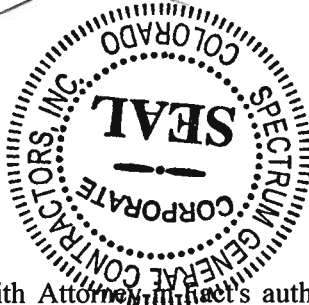
PROVIDED FURTHER, that if the said Contractor fails to duly pay for any labor, materials, team hire, sustenance, provisions, provender, gasoline, lubricating oils, fuel oils, grease, coal, or any other supplies or materials used or consumed by said Contractor or its subcontractors in performance of the work contracted to be done, or fails to pay any person who supplies rental machinery, tools or equipment, all amounts due as the result of the use of such machinery, tools or equipment in the prosecution of the work, the Surety will pay the same in any amount not exceeding the amount of this obligation, together with interest as provided by law;

PROVIDED FURTHER, that the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract, or to contracts with others in connection with this project, or the work to be performed thereunder, or the Technical Specifications and Plans accompanying the same, shall in any way affect its obligation on this bond and it does hereby waive notice of any change, extension of time, alteration or addition to the terms of the Contract, or contracts, or to the work, or to the Technical Specifications and Plans.

IN WITNESS WHEREOF, said Contractor and said Surety have executed these presents as of this 14th day of January, 20 19.

Attest:

[Signature]
Secretary



Spectrum General Contractors, Inc.

Contractor

By:

[Signature]
Oliver Loftus, President, VICE

North American Specialty Insurance Company

Surety

By:

[Signature]
Sarah Brown, Attorney In Fact

(Accompany this bond with Attorney in Fact's authority from the Surety to execute bond, certified to include the date of the bond).

APPROVED AS TO FORM:
Attorney for the City and County
of Denver

By:

[Signature]
Assistant City Attorney

APPROVED FOR THE CITY AND COUNTY OF
DENVER

By:

[Signature]
Mayor

By:

[Signature]
Exec. Dir. of Public Works

SWISS RE CORPORATE SOLUTIONS

NORTH AMERICAN SPECIALTY INSURANCE COMPANY
WASHINGTON INTERNATIONAL INSURANCE COMPANY
WESTPORT INSURANCE CORPORATION

GENERAL POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, THAT North American Specialty Insurance Company, a corporation duly organized and existing under laws of the State of New Hampshire, and having its principal office in the City of Overland Park, Kansas and Washington International Insurance Company a corporation organized and existing under the laws of the State of New Hampshire and having its principal office in the City of Overland Park, Kansas, and Westport Insurance Corporation, organized under the laws of the State of Missouri, and having its principal office in the City of Overland Park, Kansas each does hereby make, constitute and appoint:

DON APPLEBY, MARK SWEIGART, SARAH BROWN, TODD BENGFORD, SUSAN J. LATTARULO,

FLORIETTA, ACOSTA, and LEE ANNE MEAUX JOINTLY OR SEVERALLY

Its true and lawful Attorney(s)-in-Fact, to make, execute, seal and deliver, for and on its behalf and as its act and deed, bonds or other writings obligatory in the nature of a bond on behalf of each of said Companies, as surety, on contracts of suretyship as are or may be required or permitted by law, regulation, contract or otherwise, provided that no bond or undertaking or contract or suretyship executed under this authority shall exceed the amount of:

ONE HUNDRED TWENTY FIVE MILLION (\$125,000,000.00) DOLLARS

This Power of Attorney is granted and is signed by facsimile under and by the authority of the following Resolutions adopted by the Boards of Directors of North American Specialty Insurance Company and Washington International Insurance Company at meetings duly called and held on March 24, 2000 and Westport Insurance Corporation by written consent of its Executive Committee dated July 18, 2011.

"RESOLVED, that any two of the President, any Senior Vice President, any Vice President, any Assistant Vice President, the Secretary or any Assistant Secretary be, and each or any of them hereby is authorized to execute a Power of Attorney qualifying the attorney named in the given Power of Attorney to execute on behalf of the Company bonds, undertakings and all contracts of surety, and that each or any of them hereby is authorized to attest to the execution of any such Power of Attorney and to attach therein the seal of the Company; and it is

FURTHER RESOLVED, that the signature of such officers and the seal of the Company may be affixed to any such Power of Attorney or to any certificate relating thereto by facsimile, and any such Power of Attorney or certificate bearing such facsimile signatures or facsimile seal shall be binding upon the Company when so affixed and in the future with regard to any bond, undertaking or contract of surety to which it is attached."



By [Signature]
Steven P. Anderson, Senior Vice President of Washington International Insurance Company
& Senior Vice President of North American Specialty Insurance Company
& Senior Vice President of Westport Insurance Corporation

By [Signature]
Mike A. Ito, Senior Vice President of Washington International Insurance Company
& Senior Vice President of North American Specialty Insurance Company
& Senior Vice President of Westport Insurance Corporation



IN WITNESS WHEREOF, North American Specialty Insurance Company, Washington International Insurance Company and Westport Insurance Corporation have caused their official seals to be hereunto affixed, and these presents to be signed by their authorized officers this 11 day of DECEMBER, 2017.

North American Specialty Insurance Company
Washington International Insurance Company
Westport Insurance Corporation

State of Illinois
County of Cook ss:

On this 11 day of DECEMBER, 2017, before me, a Notary Public personally appeared Steven P. Anderson, Senior Vice President of

Washington International Insurance Company and Senior Vice President of North American Specialty Insurance Company and Senior Vice President of Westport Insurance Corporation and Michael A. Ito Senior Vice President of Washington International Insurance Company and Senior Vice President

of North American Specialty Insurance Company and Senior Vice President of Westport Insurance Corporation, personally known to me, who being by me duly sworn, acknowledged that they signed the above Power of Attorney as officers of and acknowledged said instrument to be the voluntary act and deed of their respective companies.



[Signature]
M. Kenny, Notary Public

I, Jeffrey Goldberg, the duly elected Vice President and Assistant Secretary of North American Specialty Insurance Company, Washington International Insurance Company and Westport Insurance Corporation do hereby certify that the above and foregoing is a true and correct copy of a Power of Attorney given by said North American Specialty Insurance Company, Washington International Insurance Company and Westport Insurance Corporation which is still in full force and effect.

IN WITNESS WHEREOF, I have set my hand and affixed the seals of the Companies this day of , 20 .

Exhibit G

DEPARTMENT OF PUBLIC WORKS Engineering Division

FINAL/PARTIAL RELEASE AND CERTIFICATE OF PAYMENT (SUBCONTRACTOR/SUPPLIER)

(PROJECT NO. and NAME)

(NAME OF CONTRACTOR)

(NAME OF SUBCONTRACTOR/SUPPLIER)

Check Applicable Box:
☐ MBE ☐ WBE

Date: _____, 20____.

Subcontract #: _____.

Subcontract Value: \$ _____.

Last Progress Payment: \$ _____.

Date: _____.

Total Paid to Date: \$ _____.

Date of Last Work: _____.

The Undersigned hereby certifies that all costs, charges or expenses incurred by the undersigned or on behalf of the undersigned for any work, labor or services performed and for any materials, supplies or equipment provided on the above referenced Project or used in connection with the above referenced Subcontract (the "Work Effort") have been duly paid in full.

The Undersigned further certifies that each of the undersigned's subcontractors and suppliers that incurred or caused to be incurred, on their behalf, costs, charges or expenses in connection with the undersigned's Work Effort on the above referenced Project have been duly paid in full.

In consideration of \$ _____ representing the Last Progress Payment referenced above and in further consideration of the Total Paid to Date, also referenced above, and other good and valuable consideration received and accepted by the undersigned this _____ day of _____, 20____, the Undersigned hereby releases and discharges the City and County of Denver (the "City"), the above referenced City Project, the City's premises and property and the above referenced Contractor from all claims, liens, rights, liabilities, demands and obligations, whether known or unknown, of every nature arising out of or in connection with the performance of the work effort.

As additional consideration for the payments referenced above, the undersigned agrees to defend, indemnify and save and hold harmless the City, its officers, employees, agents and assigns and the above-referenced Contractor from and against all costs, losses, damages, causes of action, judgments under the subcontract and expenses arising out of or in connection with any claim or claims against the City or the Contractor which arise out of the Undersigned's performance of the Work Effort and which may be asserted by the Undersigned or any of its suppliers or subcontractors of any tier or any of their representatives, officers, agents, or employees.

It is acknowledged that this release is for the benefit of and may be relied upon by the City and the referenced Contractor.

The foregoing shall not relieve the undersigned of any obligation under the provisions of the Undersigned's subcontract, as the subcontract may have been amended, which by their nature survive completion of the Undersigned's work effort including, without limitation, warranties, guarantees, insurance requirements and indemnities.

STATE OF COLORADO) ss.
CITY OF _____)

(Name of Subcontractor)

Signed and sworn before me this
day of _____, 20____.

By: _____

Notary Public/Commissioner of Oaths
My Commission Expires

Title: _____

EXHIBIT H

Notice to Proceed Form



Denver Public Works
Engineering Division
Capital Projects Management – Dept. 506
201 West Colfax Ave, Dept 614
Denver, CO 80202
www.work4denver.com

Current Date

NOTICE TO PROCEED

(SAMPLE)

Name

Company

Street

City/State/Zip

CONTRACT NO. «CONTRACT NO», «PROJECT NAME»

In accordance with General Contract Condition 302 of the Standard Specifications for Construction, General Contract Conditions, 2011 Edition, you are hereby authorized and directed to proceed on _____ with the work of constructing contract number «Contract No», as set forth in detail in the contract documents for the City and County of Denver.

With a contract time of _____ calendar days, the project must be complete on or before _____.
_____.

If you have not already done so, you must submit your construction schedule, in accordance with General Contract Condition 306.2.B, to the Project Manager within 10 days. Additionally, you must submit your tax exempt certificate, and copies of your subcontractors' certificates, in accordance with General Contract Condition 323.5, to the Project Manager as soon as possible. Failure to submit these certificates will delay processing of payment applications.

Sincerely,

Lesley B. Thomas
City Engineer

cc:

[illegible]

Exhibit I
Contractor's Certification of Payment Form



**Instructions for Completing
the
Contractor/Consultant
Certification of Payment
Form**

Office of Economic Development
Division of Small Business Opportunity
Compliance Unit
201 W. Colfax Ave. Dept. 907
Denver, CO 80202
Phone: 720-913-1999
DSBO@denvergov.org

Note: The attached Contractor/Consultant Certification of Payment form must be completed by the Contractor/Subconsultant and all subcontractors/subconsultant or suppliers used on the project at **any tier** and submitted with each pay application. The Contractor/Consultant is responsible for the accuracy of all information provided and is required to have each subcontractor/subconsultant or supplier fill out the appropriate forms. Please be sure to complete all information requested at the top of the form, including the name of the person who prepared this form.

If you reproduce this form, you must continue to list each of the originally listed firms, as well as any additional firms used during the performance period of the contract. Please complete an additional CCP if there is second tier-ing involved.

If you have any questions, please call the Compliance Unit of DSBO at 720.913.1999.

Instructions for Completing the Contractor/Consultant Certification of Payment Form, per Column

Contractor/Subcontractor or Subconsultant/Supplier Name: In the space provided, list all subcontractors/subconsultants and suppliers used on the project. For all M/W/S/E/DBEs use the exact name listed in the DSBO Directory.

M/W/S/E/DBE/NON: For each name listed, indicate whether the entity is a certified M/W/S/E/DBE.

Column A: Provide the contract amount, as listed at bid time, for the Contractor/Consultant and each subcontractor/subconsultant or supplier.

Column B: Provide the percentage portion of each listed subcontractor/subconsultant or supplier contract amount (Column A) compared to the total original contract amount in (I).

Column C: Provide the original contract amount (Column A) for each subcontractor/subconsultant or supplier plus any awarded alternate and/or change order amounts applicable. If an alternate/change order does not apply to the listed firm, re-enter the original contract amount (Column A).

Column D: Provide the percent portion of each listed subcontractor/subconsultant or supplier contract amount (Column C) compare to the current total contract amount in (II).

Column E: Provide the amount requested for work performed or materials supplied by each listed subcontractor/subconsultant or supplier for this pay application. The sum of the items in this column should equal the estimated amount requested for this pay application.

Column F: Provide the amount paid to each subcontractor/subconsultant or supplier on the previous pay application. Enter the previous pay application number in the column heading. The sum of the items listed in this column should equal the warrant amount paid to the Contractor/Consultant on the previous pay application. The amounts paid to the subcontractor/subcontractor or suppliers should be the actual amount of each check issued.

Column G: Provide the net paid to date for the Contractor/Subconsultant and each listed subcontractor/subconsultant or supplier.

Column H: Provide the percent portion of the net paid to date (Column G) for the Contractor/Subconsultant and each listed subcontractor/subconsultant or supplier of the current total contract amount in (II).

EXHIBIT J

Final Receipt Form - Certificate of Final Release



Denver Public Works
Engineering Division
Capital Projects Management – Dept. 506

201 West Colfax Ave, Dept 614
Denver, CO 80202
www.work4denver.com

Certificate of Contract Release (SAMPLE)

Date

Name

Company

Street

City/State/Zip

RE: Certificate of Contract Release for

«CONTRACT NO», «PROJECT NAME»

Received this date of the City and County of Denver, as full and final payment of the cost of the improvements provided for in the foregoing contract, _____ dollars and _____ cents (\$_____), in cash, being the remainder of the full amount accruing to the undersigned by virtue of said contract; said cash also covering and including full payment for the cost of all extra work and material furnished by the undersigned in the construction of said improvements, and all incidentals thereto, and the undersigned hereby releases said City and County of Denver from any and all claims or demands whatsoever, regardless of how denominated, growing out of said contract.

And these presents are to certify that all persons performing work upon or furnishing materials for said improvements under the foregoing contract have been paid in full and this payment to be made is the last or final payment.

Contractor's Signature

Date Signed

If there are any questions, please contact me by telephone at (720) 913-XXXX. Please return this document via facsimile at (720) 913-1805 and mail to original to the above address.

SULLIVAN GATEWAY PHASE 3

Construction Specifications Manual

Denver Colorado



Ca. 1918

March 8, 2018

Anderson Hallas Architects, PC
715 Fourteenth Street
Golden, CO 80401
303.278.4378

EXHIBIT K

**Sullivan Gateway
Denver, Colorado**

Anderson Hallas Architects, PC

00 01 01 - 1

- A. OWNER: City and County of Denver
201 West Colfax Ave
Dept. 613
Denver, CO 80202-5328
Contact: Jeru Parikh, Senior Landscape Planner
Phone: 720.913.0627
Fax: 720-913-0784
Email: jeru.parikh@denvergov.org
- B. ARCHITECT: Anderson Hallas Architects, PC
715 Fourteenth Street
Golden, CO 80401
Principal-in-Charge: Elizabeth Hallas, AIA
Project Architect: Kristen Craig, AIA
Phone: 303.278.4378
Fax: 303.278.0521
Email: elizabethhallas@andarch.com
KristenCraig@andarch.com
- C. LANDSCAPE ARCHITECT: MUNDUS BISHOP DESIGN
1525 Raleigh Street, Suite 310
Denver, CO 80205
Contact: Tina Bishop
Phone: 303-477-5244
Email: tina@mundusbishop.com
- D. ELECTRICAL ENGINEER: JCN ENGINEERING, INC
3281 Routt Street
Wheat Ridge, CO 80033
Contact: Jeff Nielsen
Phone: 303-239-0736
Email: jcneng@comcast.net

EXHIBIT K

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SECTION 00 01 07

SEALS PAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Professional seals by Design Professionals and others responsible for preparing Construction Documents:

1. Architect:

2. Landscape Architect:

3. Electrical Engineer:

END OF SECTION 00 01 07

EXHIBIT K

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SECTION 00 01 10**TABLE OF CONTENTS****PROCUREMENT AND CONTRACTING DOCUMENTS GROUP****DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS****INTRODUCTORY INFORMATION**

00 00 00	Cover
00 01 01	Project Title Page
00 01 07	Seals Page
00 01 10	Table of Contents
00 01 15	List of Drawing Sheets

CONTRACTING REQUIREMENTS

00 72 00	General Conditions (City and County of Denver)
----------	--

SPECIFICATIONS GROUP**FACILITY CONSTRUCTION SUBGROUP****DIVISION 03 – CONCRETE**

03 30 00	Cast-In-Place Concrete
03 23 11	Miracote Microtopping

DIVISION 04 – MASONRY

04 01 20.91	Unit Masonry Restoration
04 01 80.51	Terra Cotta Repair
04 21 29	Terra Cotta Masonry

DIVISION 05 – METALS

05 50 01	Metal Fabrications
----------	--------------------

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

07 19 19	Silicone Water Repellents
07 92 00	Joint Sealants

SITE AND INFRASTRUCTURE SUBGROUP**DIVISION 26 – ELECTRICAL**

26 01 00	Electric General Provisions
26 05 26	Grounding
26 11 00	Raceways
26 12 00	Conductors
26 13 00	Boxes and Fittings

DIVISION 31 – EARTHWORK

31 20 00 Earth Moving

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 11 16 Aggregate Base Course
32 13 13 Concrete Walks, Curbs and Miscellaneous Flatwork
32 15 40 Stalok Paving
32 80 00 Irrigation Systems
32 91 13 Soil Preparation
32 91 20 Topsoil
32 92 19 Turfgrass Seeding
32 92 23 Sodding
32 93 00 Trees, Plants and Groundcovers

APPENDIX

Mortar Evolution Sullivan Gate 8/23/17

END OF SECTION 00 01 10

SECTION 00 01 15**LIST OF DRAWING SHEETS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Project drawing sheets including their original date or date of latest revision.

<u>Drawing Number</u>	<u>Drawing Title</u>	<u>Drawing Date</u>
---------------------------	--------------------------	-------------------------

B. GENERAL INFORMATION

G0.1	Cover Sheet	03-08-2018
G0.2	Site Plan	03-08-2018
SS1.0	Topographic Survey (By City)	03-12-2018

C. ARCHITECTURAL

A1.0	East Plan	03-08-2018
A1.1	Elevation and Sections	03-08-2017
A1.2	Enlarged Plans and Details	03-08-2018
A1.3	Details	03-08-2018
A1.4	Wall Elevation	03-08-2018
A1.5	East Repair Plan	03-08-2018
A2.0	Enlarged Wall Elevation	03-08-2018

D. LANDSCAPE

L1.0	Demolition Plan	03-08-2018
L2.0	Layout and Materials Plan	03-08-2018
L3.0	Grading Plan	03-08-2018
L3.1	Grading Images	03-08-2018
L4.0	Site Details	03-08-2018
L4.1	Site Details	03-08-2018
L5.0	Planting Plan	03-08-2018
L5.1	Planting Details	03-08-2018
I1.0	Irrigation Notes and Schedule	03-08-2018
I1.1	Irrigation Plan	03-08-2018
I1.2	Irrigation Details	03-08-2018

E. ELECTRICAL

E1.0	Electrical Site Plan, Legend & Schedule	03-08-2018
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END OF SECTION 00 01 15

EXHIBIT K

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SECTION 03 30 00**CAST-IN-PLACE CONCRETE****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Concrete statue repair.
 - 2. Concrete curing.
- B. Related Sections:
 - 1. Section 07 92 00: "Joint Sealants."

1.2 SUBMITTALS

- A. Product Data:
 - 1. Submit with application and installation instructions for proprietary materials and items including patching materials, vent screens, rain catches and curing compound.
- B. Mix Designs: Submit substantiating data for each concrete mix design for use on Project not less than four weeks prior to first concrete placement.

1.3 QUALITY ASSURANCE

- A. Concrete testing shall be conducted to determine the strength and composition of existing materials. Patching material shall match historic composition.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Mixing Time: Use all concrete mixed within 2 hours after mixing water has been added.
- B. Extra Water: Should extra water be required before depositing concrete, Contractor shall have sole authority to authorize addition of water.

1.5 JOB CONDITIONS

- A. Environmental Requirements:
 - 1. Cold Weather Requirements: When depositing concrete when mean daily temperatures are below 40 degrees F., follow recommendations of ACI 306.
 - 2. Hot Weather Placement: When depositing concrete in hot weather, follow recommendations of ACI 305.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Pigmented Concrete Material Content:
 - 1. Composition and color to match historic, per materials testing.
 - a. Aggregate
 - b. Strength
 - c. Color

- B. Vent holes and rain catches:
 - 1. Stainless steel.
 - 2. Size shall correspond in size to diameter of associated openings.
- C. Curing Materials:
 - 1. Absorptive Cover: Burlap cloth made from jute, weighing approximately 9 ounces-per-square-yard., complying with AASHTO M182, Class 2, new and free of any contaminants.
 - 2. Moisture-Retaining Cover: Waterproof paper. Polyethylene film.
 - 3. Spray Applied Membrane Forming Liquids:
 - a. ASTM C309, Type 2, Class A.
 - b. Compatible with required finishes and coatings.
 - c. Applied at rate of 200 SF per gallon.
- D. Admixtures: No admixtures may be used without specific approval of Architect.
- E. Mortar for Concrete Repair: Shall be made of same materials as used for concrete, except that coarse aggregate shall be omitted and mortar shall consist of not more than one part cement to two and one-half parts sand by damp loose volume.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Wash statue to remove foreign debris from surface and to allow for new materials to bond to a clean surface.
- B. Remove existing loose sections of the statue and replace / re-sculpt to bring back original profiles and detailing.
- C. Patch as necessary at cracks and remove delaminating areas.
- D. Resurface the entire exterior surface with a like kind matching existing material with integrated color.
- E. Replace rusted vents as necessary and re-screen the vent holes and rain catches.

3.2 CURING AND PROTECTION

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

3.3 REPAIR

- A. Unformed Surfaces: Correct high areas by grinding or other methods after concrete has cured a minimum of fourteen days. Correct low areas with patching materials.

SECTION 03 01 30

RESURFACING OF CAST-IN-PLACE CONCRETE – MIRACOTE MICROTopping

PART 1 – GENERAL

1.1 SUMMARY

- A. Provide all labor, materials, equipment and supervision as necessary to install a two-component, polymer-modified, cementitious protective resurfacing system over existing horizontal, exterior concrete slab surfaces, as shown on the project drawings and as outlined in this specification.
- B. Following all applicable manufacturer's guidelines and application instructions shall be considered a requirement of this specification.
- C. Related Sections:
 - 1. Section 32 13 13 – Concrete Walks, Curbs, and Miscellaneous Flatwork

1.2 REFERENCES

- A. ASTM C109: Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.
- B. ASTM C190: Method of Test for Tensile Strength of Hydraulic Cement Mortars.
- C. ASTM C580: Standard Test Method for Flexural and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
- D. ASTM D4263: Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Test Method.
- E. ASTM F1869-04: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Sub-floor Using Anhydrous Calcium Chloride.
- F. ICRI Technical Guideline No.03732: Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.

1.3 SUBMITTALS

- A. General: Submit (2) copies each of the following items in accordance with the requirements of the Conditions of Contract and in Division 1 Specification Sections.
- B. Product Data: Submit manufacturer's technical data sheets, any applicable installation guidelines or recommendations, and material safety data sheets for each product included in this specification.
- C. Samples: For initial selection, submit manufacturer's standard color charts for review by the specification authority and owner's representative. For final selection, submit sample boards to exhibit pattern, texture, color and finish of the decorative cementitious resurfacing system. If a clear coat sealer finish is desired, submitted sample boards shall also include same.
- D. Material certificates signed by the manufacturer certifying that the protective, two-component, polymer-modified, cementitious resurfacing system complies with all requirements of the material specified herein.
- E. Warranty: Submit a sample of the manufacturer's standard material warranty.

- F. Contractor Project Reference List: Contractor shall submit a minimum of 5 recently completed projects of a similar nature and include total contract value of completed work.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: The manufacturer of the products specified in this section shall have a minimum of 5 years experience in the production of these types of products.
- B. Contractor Qualifications: The contractor installing the products specified in this section shall have a minimum of 3 years experience and have successfully completed no less than 5 projects similar in scope and complexity, and is acceptable to and has been trained by the manufacturer.
- C. Substitutions: Requests for the approval of any product other than those specified in this section must be submitted to the specifying authority two weeks prior to the bid, and shall include complete application specifications and physical characteristics. Any request after this date will not be accepted. Failure of performance requires immediate removal and replacement of unapproved substituted material with those originally specified at no cost to the owner, Architect, construction manager, or general contractor.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original packages and containers with seals unbroken and bearing manufacturer's labels containing brand name, batch or lot numbers, and directions for storage and mixing with other components.
- B. Store materials to comply with manufacturer's directions to prevent from damage and/or deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

1.6 PROJECT CONDITIONS

- A. Environmental Conditions: Comply with all the manufacturer's directions for maintenance of ambient and substrate temperature, moisture, humidity, ventilation, and other conditions required to execute and protect completed work. In hot and cold weather conditions or when high evaporation rates or adverse conditions may be expected, the contractor will be responsible for the quality of the completed installation. Follow all recommendations and guidelines of the American Concrete Institute, as published in ACI Committee 305 for Hot-Weather Concreting and ACI Committee 306 for Cold-Weather Concreting.
- B. Lighting: Permanent lighting will be in place and working before installing the two-component, polymer-modified cementitious architectural resurfacing system.
- C. Protection: Protect newly installed cementitious resurfacing system from rain or other potentially harmful climatic conditions for a minimum of 24 hours, from any potential damages due foot or vehicular traffic, and/or from the work of other trades.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Miracote Division of Crossfield Products Corp., 3000 E. Harcourt Street, Rancho Dominguez, CA 90221, (310) 886-9100; also 140 Valley Road, Roselle Park, NJ 07204, (908) 245-2800, www.miracote.com, provided by the following supplier:
- B. Colorado Hardscapes, 8085 Harvard Ave., Denver, CO 80231, (303) 750-8200.

2.2 MATERIALS

- A. Cementitious Resurfacing Material: Miracote MPC (Multipurpose Protective Coating) is a pre-packaged,

two-component, polymer-modified, cementitious resurfacing system that is applied in a nominal thickness from 1/16" to 3/32" on to properly prepared, new or existing, concrete substrates. One unit of Miracote MPC consists of one (1) five gallon pail of Liquid Catalyst, and two (2) 55# bags of dry powder available in choice of two colors, white and natural cement, and two grades, smooth and regular.

- B. Color Pigmentation: Miracote ColorPax LIP for pigmenting Miracote MPC is available in 38 standard colors (includes capability to match special colors) that are mixed with white powder to match published color charts.
- C. Sealers and Finish Coats: Miracote HDWB Waterproofing Sealer, Matte finish.

2.3 PROPERTIES

- A. Physical Properties:
Provide a two-component only, polymer-modified, cementitious resurfacing system that meets or exceeds the listed minimum physical property requirements when tested in accordance with the referenced standard test method.

Two Component System	Liquid Polymer and Bagged Powder
Compressive Strength (ASTM C 109):	2,440 psi
Tensile Strength (ASTM C 190):	450 psi
Flexural Strength (ASTM C 580)	2,415 psi
Adhesion (MIL-D-3134, Para.4.7.14):	515 psi
Water Absorption (ASTM C 642)	1.61% volume of permeable voids 5.07%
Water Vapor Permeability (ASTM E 96)	1.96 perms/inch
Impact Resistance: (MIL-3134) Para. 4.7.3 (2# steel ball dropped from 8' height onto coated steel plate)	No cracking or detachment

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine all concrete or other substrates and conditions where the architectural cementitious resurfacing system is to be installed. Notify the Owner of any unsatisfactory conditions that may be detrimental to the proper and timely completion of the work.
- B. Do not proceed with the work until all such deficiencies have been corrected by the Contractor in an acceptable manner, and as approved by the Owner.

3.2 PREPARATION

- A. Protect all surrounding areas, walls, window glass, landscaping and other adjacent surfaces from the execution of each item of work including, but not limited to, surface preparation and all application steps of the cementitious resurfacing installation.
- B. Perform surface and crack repairs as necessary to re-profile, re-level or to restore the integrity of the

concrete substrate in general, as directed by the specifying authority. Concrete surface repair products shall be from the same manufacturer, or as approved by the manufacturer of the concrete resurfacing system specified herein. Provide letter from the manufacturer of the surface repair materials verifying compatibility with all the specified architectural resurfacing components.

- C. Architectural cementitious resurfacing system must be applied to a clean, sound and mechanically prepared concrete substrate to a minimum CSP-5 surface profile, in accordance with the International Concrete Repair Institutes (ICRI) Technical Guideline 03732, **Selecting and Specifying Concrete surface Preparation for Sealers, Coatings and Polymer Overlays.**
- D. Contractor shall perform tensile bond tests, as directed by the Specification Authority, in accordance with International Concrete Repair Institutes (ICRI) Technical Guideline 03739, **Guide to Using In-Situ Tensile Pull-Off Tests to Evaluate Bond of Concrete Surface Materials.**

3.3 APPLICATION

- A. General: Follow all manufacturers' directions, as published in their product technical data sheets and/or available installation guidelines regarding the application of the protective cementitious resurfacing system, as specified herein.
- B. Substrate Conditioning: Dampen substrate with potable water only. Maintain substrate at saturated surface dry (SSD) condition with no standing water or puddles during the placement of the base coat.
- C. Priming: Not required for the installation. Base coat of the cementitious resurfacing material must be applied over a saturated surface dry (SSD) concrete substrate.
- D. Cementitious Resurfacing: Install architectural two-component, polymer-modified, cementitious resurfacing system in strict conformance to the most current version of the manufacturer's published installation guidelines and technical instructions. Mix and spread resurfacing material onto substrate with magic trowels, hand trowels, squeegees, rollers or other acceptable placement tools in two or more coats depending on traffic, exposure conditions or as specified herein. A wet edge shall be maintained at all times while placing freshly mixed cementitious resurfacing materials. The finished resurfacing installation shall have a uniform thickness of 1/16" to 3/32" for a two coat system, and 3/32" to 1/8" for a three coat system.

3.4 CLEANING

- A. Clean work area and remove/discard all debris resulting from the application of the cementitious resurfacing system to the acceptance of the Owner.

3.5 PROTECTION

- A. Protect all completed work of the application during the specified cure time of the material from vehicular or pedestrian traffic, or any exposure to solid or liquid spillage or any other form of contamination.

END OF SECTION 03 01 30

SECTION 04 01 20.91**UNIT MASONRY RESTORATION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Unit masonry repair, replacement, and re-pointing.
 - 2. Unit masonry rebuilding, patching, and joint repair.
- B. Related Sections:
 - 1. Section 04 01 80.51: "Terra Cotta Repair."
 - 2. Section 04 21 29: "Terra Cotta Masonry."
 - 3. Section 07 92 00: "Joint Sealants."

1.2 SUBMITTALS

- A. Product Data: Manufacturer's technical data for each product indicated including recommendations for their application and use; including test reports and certifications substantiating that products comply with requirements.

1.3 QUALITY ASSURANCE

- A. Restoration Specialist: Work shall be performed by a firm having not less than five years successful experience in comparable unit masonry restoration projects and employing personnel skilled in unit masonry restoration processes and operations indicated.
- B. Cleaning Specialist: Work shall be performed by a firm having not less than five years successful experience in using specified restorative cleaning techniques.
- C. Contractor must be fully conversant with Secretary of the Interior's "Standards for the Rehabilitation of Historic Buildings" and attendant preservation briefs associated with stone restoration and cleaning.
- D. Cleaning:
 - 1. Test adjacent non-masonry materials for possible reaction with cleaning materials.
 - 2. Allow waiting period of duration indicated, but not less than seven calendar days, after completion of sample cleaning to permit study of sample panels for negative reactions.
 - 3. Tuck-pointing: New mortar color shall match mortar color of adjacent area.
- E. Sandblasting and/or use of non-proprietary acids, alkalis, powdered or liquid, will not be permitted.

1.4 PROJECT CONDITIONS

- A. Do not remove paint from unit masonry, re-point mortar joints, repair unit masonry or clean unit masonry unless air temperatures are between 40 and 80 degrees F, and will remain so for at least forty-eight hours after completion of work.
- B. Cold Weather Requirements: IMIAC-recommended practices and specifications for cold weather unit masonry construction.

1.5 SEQUENCING AND SCHEDULING

- A. Coordinate masonry work with other trades.
- B. Perform unit masonry repair work in following sequence:
 - 1. Rake out existing mortar from joints where deteriorated or indicated to be re-pointed.
 - 2. Deteriorated joints are defined as having loose or missing mortar; excessively soft mortar; powdery or crumbling mortar; cracks that weaken the bond between masonry units; voids; or badly stained pointing.
 - 3. Remove masonry units to be replaced.
 - 4. Clean existing unit masonry surfaces.
 - 5. Point existing mortar joints of unit masonry which are deteriorated or indicated on drawings to be restored.
 - 6. Salvage anchorage devices and headers for re-use.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Masonry: Brick: Provide soft clay brick to match existing shape, color, texture and size.
- B. Mortar: Refer to Paragraph below.
- C. Cleaning:
 - 1. Materials:
 - a. Water for Cleaning: Clean, potable, free of oils, acids, alkalis, salts and organic matter.
 - b. Brushes: Fiber bristle only.
 - c. Detergent: Mild non-ionic detergent soap or an Architect approved masonry detergent as manufactured by Prosoco or an equivalent product of an approved manufacturer.
 - d. Do not use cleaners containing hydrochloric acid.
 - 1. Equipment:
 - a. Provide spray equipment for controlled spray application of water and detergent cleaners, if any, at rates indicated for pressure (maximum 100 PSI, measured at nozzle at 4 to 6 GPM).
 - b. For spray application of water and detergents provide fan-shaped spray-tip which disperses water in a flat 25 to 30 degree wide spray.
 - c. On particularly fragile surfaces, use of an oscillating nozzle should be considered, thereby eliminating potential of over-spraying a small area.
 - d. For spray application of heated water provide equipment capable of maintaining temperature, at flow rates indicated, between 140 and 180 degrees F.
 - 3. Detergent Solutions: Dilute detergent cleaning materials with water to product solutions of concentration indicated, but not greater than that recommended by detergent manufacturer.

2.2 MORTAR MIXES

- A. Measurement and Mixing:
 - 1. Measure cementitious and aggregate material in a dry condition by volume or equivalent weight.
 - 2. Do not measure by shovel, use known measure.
 - 3. Mix materials in a clean mechanical batch mixer.
- B. Mixing Pointing Mortar:
 - 1. Thoroughly mix cementitious and aggregate materials together before adding any water.

2. Then mix again adding only enough water to produce a damp, unworkable mix which will retain its form when pressed into a ball.
 3. Maintain mortar in this dampened condition for one to two hours.
 4. Add remaining water in small portions until mortar of desired consistency is reached.
 5. Use mortar within thirty minutes of final mixing; do not re-temper or use partially hardened material.
- C. Do not use admixtures of any kind in matching mortar.
- D. Setting Historic Masonry Above Grade:
1. One part Portland cement, four parts lime (sifted), eight parts sand.
 2. Match existing mortar by analyzing an unweathered sample taken from a joint within existing wall adjacent to work.
- E. Pointing or Repointing Historic Masonry:
1. One part Portland cement, four parts lime.
 2. Match existing mortar by analyzing an unweathered sample taken from a joint within existing wall adjacent to work.
- F. Pointing/Rebuilding Mortar for Unit Masonry:
1. One part cement, three parts lime, twelve parts sand.
 2. Total binder-to-sand ratio should always be approximately one part lime, three parts sand.
 3. At mason's discretion, cement, lime, and sand ratios may be adjusted to a one-and-one-half parts cement, two-and-one-half parts lime, twelve parts sand to improve strength and workability of mortar.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Comply with recommendations of manufacturers of detergent cleaners for protecting building surfaces against damage from exposure to their products.
- B. Protect persons, motor vehicles, surrounding surfaces of building, building site and surrounding buildings and all landscape and lawn areas from injury resulting from unit masonry repair work.
- C. Prevent chemical cleaning from coming into contact with pedestrians, motor vehicles, landscaping, buildings and other surfaces which could be injured by such contact.
- D. Do no unit masonry cleaning during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
- E. Dispose of run-off from cleaning operations nightly by legal means in accordance with local codes and in a manner which prevents soil erosion, undermining of paving and foundations, damage to landscaping and water penetration into building interiors.
- F. Erect temporary protection covers over pedestrian walkways and at points of entrance and exit for persons and vehicles which must remain in operation during course of unit masonry restoration work.
- G. Protect unpainted metal and wood from contact with detergent cleaners by covering them with polyethylene film and water-proof masking tape.
- H. Prevent grout or mortar used in re-pointing and repair work from staining face of surrounding unit masonry and other surfaces.

- I. Remove immediately grout and mortar in contact with exposed unit masonry and other surfaces.
- J. Protect sills, ledges, projections and sidewalks from mortar droppings.

3.2 APPLICATION

A. Re-pointing Existing Unit Masonry:

1. Rake out deteriorated mortar from joints to depths equal to two-and-one-half times their widths, but not less than 3/4 inch nor less than that required to expose sound, un-weathered mortar.
2. Re-point unit masonry only where mortar is deteriorated, not providing a weatherproof joint or where mortar is missing.
3. Remove mortar from unit masonry surfaces within raked-out joints to provide reveals with square backs and to expose unit masonry for contact with pointing mortar.
4. Brush, vacuum or flush joints to remove dirt and loose debris.
5. Do not spall edges of masonry units or widen joints.
6. Replace any masonry units which become damaged.
7. Cut out old deteriorated mortar by hand with chisel and mallet.
8. Power operated rotary hand saws and grinders may be permitted, but only on horizontal joints (a pneumatic chisel may be allowed on vertical joints to facilitate efficiency) and only on specific written approval of Architect based on submission by Contractor of a satisfactory quality control program and demonstrated ability of operators to use tools without damage to unit masonry.
9. Quality control program shall include provisions for supervising performance and preventing damage due to worker fatigue.
10. Deteriorated mortar joints are joints which are no longer providing weather protection and/or have lost bond to brick by cracks which are grater than hair-line, or mortar has deteriorated greater than 1/2 inch or existing mortar crumbles to touch.

B. Joint Pointing:

1. Rinse unit masonry joint surfaces with water to remove any dust and mortar particles.
2. Time application of rinsing so that, at time of pointing, excess water has evaporated or run off, and joint surfaces are damp, but free of standing water.
3. Apply first layer of pointing mortar to areas where existing mortar was removed to depths greater than surrounding areas.
4. Apply in layers not greater than 3/8 inch until a uniform depth is formed.
5. Compact each layer thoroughly and allow to become thumbprint-hard before apply next layer.
6. After joints have been filled to a uniform depth, place remaining pointing mortar in 3 layers with each of first and second layers filling approximately 2/5 of joint depth and allow to become thumbprint hard before applying next layer.
7. Recess final layer slightly from face where existing bricks have rounded edges.
8. Take care not to spread mortar over edges onto exposed unit masonry surfaces, or to featheredge mortar.
9. Tool joints to match original appearance of joints when mortar is thumbprint hard.
10. Remove excess mortar from edge of joint by brushing.
11. Cure mortar by maintaining in a damp condition for not less than seventy-two hours.
12. Where re-pointing work precedes cleaning of existing unit masonry, allow mortar to harden not less than thirty days before beginning cleaning work.

C. Epoxy Stabilization of Hairline Cracks in Unit Masonry:

1. Clean cracks of all loose debris.
2. Mask areas around crack to prevent over epoxy.
3. Inject epoxy into crack uniformly per manufacturer's direction.

4. Remove masking and over epoxy.

D. Crack Patching and Repair:

1. Repair procedures presented below address aesthetic repair of non-structural and non-active loss, chips, cracks, and areas of previous patching.
2. Cracks Less Than 1/32 inch in Width: Hairline cracks do not require intervention at this time.
3. Cracks 1/32 inch to 1/16 inch in Width, Stable Unit Elements:
 - a. Cut along full length of crack with a grinding tool fitted with appropriate grinding tip to widen crack to at least 3/16 inch wide by 1/2 inch deep.
 - b. Areas to be cut should be interior “dovetailed” or under-cut to provide positive anchor keying where possible.
 - c. Clean out all residual dust along full length of crack with compressed air, followed by degreasing solution (one part water, one part degreasing alcohol) followed by pressure rinse and pre-wet as appropriate to materials employed.
 - d. Apply cementitious injection grouting compound, sculpting compound to match original profiles.
4. Cracks 1/16 inch to 1/4 inch in Width, Stable Unit Elements:
 - a. Cut along full length of crack with grinding tool fitted with appropriate grinding tip to widen crack to approximately 3/16 inch wide by 1/2 inch deep.
 - b. Areas to be cut should be interior “dovetailed” or back-cut to provide positive anchor keying wherever possible.
 - c. Clean out all residual dust along full length of crack with compressed air, followed by degreasing solution (one part water, one part ethyl alcohol), followed by pressure rinse and pre-wet as appropriate to materials employed.
 - d. Dam crack with water soluble clay to prevent leakage of grout.
 - e. Use clay to keep grout back from exterior surface a minimum 1/4 inch.
 - f. Inject crack with non-shrink injection grout.
 - g. Following cure of injection grout, apply cementitious compound sculpted to match original profile.
5. Previous Incompatible Repairs:
 - a. Cut straight back around full perimeter and area of chip to a minimum depth of 1/2 inch with grinding tool fitted with appropriate grinding tip so that patch in-fill will not have a feathered edge.
 - b. Make cut as straight and even as possible, following general line of loss.
 - c. At this perimeter provide interior “dovetailed” or under-cuts to provide positive anchor keying for patching mortar.
 - d. Remove any residual dust with a pressure water wash.
 - e. Clean, remove, or abrade any loose or rough material with a non-ferrous abrasive.
 - f. Scarify surface to assure adhesion of repair.
 - g. Clean and pre-wet surface as appropriate to receive cementitious repair.
 - h. Apply cementitious compound to repair area.
 - i. Sculpt compound to match original profiles, give finished patch wet-struck finish.
6. Metallic Elements Removal:
 - a. Remove all metallic elements from unit masonry except for terra cotta hangers for re-use; those which cannot be removed manually should be carefully core-drilled out, removing metal and as little original unit masonry as possible.
 - b. Clean, remove, or abrade any loose or rough unit masonry material with a non-ferrous abrasive type grinding tool fitted with appropriate stone grinding tip so that patch in-fill will not have a feathered edge.
 - c. Scarify surface to assure adhesion of repair.
 - d. At perimeter of void, provide interior “dovetails” or under-cuts to provide positive and or keying for patching mortar.

- e. Remove any residual dust with a pressure water wash.
- f. Clean and pre-wet surface as appropriate to receive cementitious repair.
- g. Apply restoration mortars to repair area.
- h. Sculpt compound to match original profiles, give finished patch wet-struck finish.
- i. Use compound in accordance with manufacturer's recommended application procedures and under manufacturer's required safety and environmental conditions.
- j. Following cure, mechanically or chemically expose aggregate by removing latence from surface of patch.
- k. Wash any remaining residue from surface with clean water.

3.3 CLEANING

- A. After mortar has fully hardened, thoroughly clean exposed unit masonry surfaces of excess mortar and foreign matter using stiff nylon or bristle brushes and clean water, spray applied at low pressure.
- B. Heat water to temperature of 140 to 180 degrees F.
- C. If sample cleaning reveals that stiff brush scratches masonry, use of a soft bristle brush will be recommended.
- D. Use of metal scrapers or brushes will not be permitted.
- E. Use of acid or alkali cleaning agents will not be permitted.
- F. Use mild detergent cleaning agents first; then use a unit masonry restoration cleaner if further cleaning is required.

END OF SECTION 04 01 20.91

SECTION 04 01 80.51**TERRA COTTA REPAIR****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Glazed architectural terra cotta repair work.
- B. Related Sections:
 - 1. Section 04 01 20.91: "Unit Masonry Restoration."
 - 2. Section 04 21 29: "Terra Cotta Masonry."
 - 3. Section 07 19 19: "Silicone Water Repellents."
 - 4. Section 07 92 00: "Joint Sealant."

1.2 REFERENCES

- A. National Concrete Masonry Association (NCMA).
- B. American Society for Testing and Materials (ASTM), C67, C126, and C212.

1.3 SUBMITTALS

- A. Mock ups: Full size terra-cotta units showing full range of exposed colors, textures, and dimensions to be expected in completed repair.
Provide mockups for:
 - 1. Patching (thin and deeper).
 - 2. Patching and re-glazing.
 - 3. Patching, re-glazing and resurfacing.
 - 4. Clear masonry coating re: 07 19 19.
- B. Protect mockups for comparison with work to be completed.
- C. Contractor Qualifications: List of past 5 years comparable terra cotta projects.
- D. References: Submit references with name of contact person and telephone number for two submitted similar projects.

1.4 QUALITY ASSURANCE

- A. Contractor Qualifications: All work shall be performed by masons experienced in handling and setting of material having not less than ten years satisfactory experience in comparable repairs to historic terra cotta including work on at least two projects similar in scope and scale to this Project.

1.5 PROJECT/SITE CONDITIONS

- A. Cold-Weather Requirements:

1. Do not work in temperatures below 40 degrees F., when substrate is colder than 40 degrees F., or when temperature is expected to fall below 40 degrees F. for forty-eight hours after installation of mortar.
2. Building an enclosure and heating areas to maintain this temperature may only be done with written approval of material manufacturer.
3. Remove work exposed to lower temperatures as directed by Architect.

B. Hot Weather Requirements:

1. Protect mortar from direct sunlight and wind using protections measures submitted and approved when ambient air temperature exceeds 70 degrees F.
2. Do not use or prepare mortar when ambient air temperature is above 90 degrees F. at location of Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Terra Cotta Repair:

1. Edison Coatings (basis of design).
2. Cathedral Stone Products, Inc./Jahn.
3. Equivalent products from an approved manufacturer.

B. Terra Cotta Glaze:

1. Edison Coatings (basis of design).
2. Cathedral Stone.
3. Equivalent products from an approved manufacturer.

C. Cleaners:

1. ProSoCo.
2. Equivalent products from an approved manufacturer.

2.2 MATERIALS

A. Mortar: Type O Mortar (used in Phase 1 and 2)

1. Shall comply with ASTM C270.
2. Cementitious Materials:
 - a. Portland Cement: ASTM C150, Type I or II; low-alkali per ASTM C150, Table 2.
 - b. Hydrated Lime: ASTM C207, Type S.
 - c. Masonry cements, gypsum Portland cements, or blended cements will not be allowed.
3. Aggregates:
 - a. Sand, clean, washed natural or manufactured silica sand graded according to ASTM C144, shall contain no more than fifty parts-per-million of chloride ions, and shall be free of organic contaminants.
 - b. Course Aggregates:
 - 1) ASTM C404 with a maximum size of 3/8 inch diameter.
 - 2) Shall contain no more than fifty parts-per-million of chloride ions and shall be free of organic contaminants.
4. Water: Potable, clean and free from injurious amount of oil, alkali, organic matter or other deleterious material.

- B. Terra-cotta repair:
 - 1. Edison Coatings, Inc.: Custom System 45 and Thin-Fill 55; ASTM C580; ASTM C157.
 - 2. Cathedral Stone – M100 Terra Cotta Repair Mortar.
 - 3. Equivalent products from an approved manufacturer and approved by mock-up.
- C. Terra-cotta glaze:
 - 1. Edison Coatings, Inc.: Primer 240 and Elastowall 351; ASTM D-160; ASTM D-714.
 - 2. Glaze Repair: TerraCoat, two-component, water-based epoxy paint, sheen finish, color as selected by Architect.
 - 3. Edison Coatings, Inc.: Aquaspex 220.
 - 4. Equivalent products from an approved manufacturer and approved by mock-up.
- D. Related Materials:
 - 1. Edison Coatings, Inc.: Restoration Latexes – to enhance performance and workability of cement based patching materials.
 - 2. Edison Coatings, Inc.: Primer 240 – to develop high bond strength to coatings; ASTM G53.
 - 3. Equivalent products from an approved manufacturer and approved by mock-up.
- E. Cleaners:
 - 1. Light Staining: BioKlean, biological and atmospheric stain remover.
 - 2. Medium Staining: EK Restoration Cleaner, concentrated “carbon solubilizer” formulated compound.
 - 3. Heavy Staining: 766 Limestone and Masonry Prewash/Afterwash, alkaline-based cleaning compound.
- F. Anchors:
 - 1. Anticipate salvage and re-use of 90% of existing anchors.
 - 2. Allow for 10% replacement anchors:
 - a. Hohmann and Barnard Stainless Steel anchors “#402R Stone Anchor.”

2.3 MISCELLANEOUS ACCESSORIES

- A. Anchor Bolts: Stainless Steel bolts complying with ASTM A307, Grade A (ASTM F568, Property Class 4.6); with ASTM A563 (ASTM A563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A153, Class C; of diameter and length indicated.
- B. Compressible Filler: Pre-molded filler strips complying with ASTM D1056, Type 2, Class A, Grade 1.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Conduct site survey of existing terra cotta units prior to submittal of shop drawings and fabrication of terra cotta pieces.
- B. Clean existing terra cotta units.
- C. Identify and code pieces to be replaced.

- D. Collect measurements, take photographs, make field sketches, and record other data as required for design and fabrication of replacement pieces.
- E. Sample and determine compressive strength of existing mortar. Identify joints to be re-pointed.
- F. Illustrative samples:
 - 1. Carefully remove existing terra cotta pieces required as samples to use in preparation of molds for fabrication of replacement pieces.
 - 2. Pack, crate, and delivery samples to manufacturer's plant.
 - 3. Provide temporary protection to prevent moisture penetration into structure where terra cotta pieces are removed.
- G. Refer to terra cotta rehabilitation notes on drawings.

3.2 COORDINATION

- A. Coordinate requirements for steel support members with plumbing for fountain work and site work for grading, embedded anchors, flashings, and sheet metal with other work to ensure timely and accurate placement.

3.3 PRE-INSTALLATION CONFERENCE

- A. Convene a pre-installation conference prior to commencing work of this Section.
- B. Require attendance of entities directly concerned with work related to terra cotta restoration.
- C. Notify Architect five days in advance of meeting.
- D. Review:
 - 1. Items of restoration to be performed, procedures, and work sequence.
 - 2. Requirements for steel support members and embedded anchors.
 - 3. Protection of installed items and finishes.
 - 4. Availability of materials.
 - 5. Preparation of substrate.
- E. Record minutes, and distribute copies within five days to Architect, Owner, and other participants.

3.4 CLEANING EXISTING TERRA COTTA

- A. Clean all existing terra cotta surfaces.
- B. Protect areas below cleaning operation.
- C. Clean with detergent and clean water using fiber brushes and cloths.
- D. Do not use metallic tools for cleaning and scraping.
- E. Thoroughly rinse and wash off cleaning solution and dirt.

3.5 REMOVAL FOR REBUILDING

- A. Terra cotta veneer is to be removed as needed to facilitate repairs and install of new units.
- B. Cut out deteriorated terra cotta pieces to be replaced in manner to prevent damage to remaining terra cotta and adjoining materials.
- C. Cut away loose or unsound adjoining mortar and grout to provide clean surfaces and solid bearing for setting new pieces.

3.6 REPAIRING

- A. Repair chipped and broken terra cotta pieces.
- B. Remove loose material and clean surfaces to be repaired.
- C. Apply patching compound in accordance with manufacturer's instructions.
- D. Sculpt material to match existing profiles and ornamental designs.
- E. Provide smooth transition between new and existing surfaces.
- F. After compound has set and cured, apply primer and two finish paint coats.
- G. Blend and distress paint to match appearance and color of existing terra cotta.

3.7 RE-POINTING

- A. Re-point all existing mortar joints.
- B. Use tools and methods that do not damage terra cotta.
- C. Remove dust and loose material by brushing, water spray, or air jet.
- D. Moisten joint.
- E. Tightly pack new mortar in 1/4 inch layers.
- F. Form smooth joint to match existing.
- G. Moist cure for seventy-two hours.

3.8 INSTALLATION OF NEW TERRA COTTA/REPAIRED TERRA COTTA

- A. Install new terra cotta pieces adjacent to repaired terra cotta in accordance with manufacturers recommended instructions and approved shop and setting drawings.
- B. Preparation:
 - 1. Securely attach anchors, hangers, bolts, clips, rods, and pins as required for securing terra cotta pieces.
 - 2. Use type of fastener and spacing recommended by terra cotta manufacturer.

3. Ensure items are properly sized and accurately located.
 4. Soak walls to receive new terra cotta by spraying with clean water at beginning of day and again within one hour of setting pieces.
 5. Soak terra cotta pieces sixty minutes prior to installation.
- C. Field cutting:
1. Where cutting is required to accommodate non-standard conditions, use power saw with abrasive or diamond blade and rigid cutting templates.
 2. Do not reduce strength of terra cotta by cutting webs and partitions.
- D. Set terra cotta plumb, true, and aligned.
- E. Maintain courses to uniform dimension.
- F. Projecting terra cotta shall be aligned and uniform such that shadow cast is true line.
- G. Anchor installation method:
1. Attach new terra cotta pieces to substrate with metal anchors as detailed on approved shop and setting drawings.
 2. Set pieces in solid mortar bed.
 3. Fill all spaces between terra cotta and substrate with grout or mortar.
 4. Spaces greater than 3/4 inch: Fill with grout.
 5. Spaces 3/4 inch or less: Fill with mortar.
- H. Adhesion installation method:
1. Immediately before application of mortar, brush coat of Portland Cement and water on back of terra cotta piece and on portion of wall to receive terra cotta.
 2. Spread mortar on back of terra cotta piece and portion of wall to receive piece such that total mortar thickness averages 3/4 inch.
 3. Tap piece in place completely filling voids and extruding slight excess at joints and edges.
- I. Open back terra cotta shapes shall be filled solidly with grout prior to installation.
- J. Allow grout to set enough to permit handling.
- K. Ensure that all rebates in bed and cross joints on sides and back are filled solid with mortar.
- L. Leave no voids.
- M. Adjustments:
1. Do not shift or tap terra cotta pieces after mortar has achieved initial set.
 2. If adjustments are required or pieces are disturbed after setting, remove, clean, and relay with fresh mortar.
- N. Grouting:
1. Fill terra cotta formed cavities containing reinforcement and other locations indicated on approved shop and setting drawings with grout.
 2. Place and consolidate grout without displacing reinforcement.
 3. Ensure that steel reinforcement, supports, anchors, and ties are encased with grout or mortar and permanently protected from corrosion.

3.9 JOINTS

- A. Mortar Joints:
 - 1. Size: 1/4 inch wide unless otherwise indicated on approved shop and setting drawings.
 - 2. Form vertical and horizontal joints of uniform thickness to match historic tooling.
 - 3. Point joints as work progresses.
 - 4. When re-pointing is required, rake joint 3/4 inch, drive pointing mortar into joint, and strike with jointing tool.
- B. Expansion joints: Provide expansion joints in linear terra cotta runs, at shelf supports, and other locations indicated on approved shop and setting drawings to accommodate deflection, thermal changes, and settlement.
 - 1. Maximum distance between expansion joints: 25 feet.
 - 2. Rake out expansion joints to full depth of setting bed at time terra cotta is installed.
 - 3. Install joint backing with blunt instrument.
 - 4. Do not twist rod.
 - 5. Backing shall be 1/4 inch from terra cotta surface.
 - 6. Apply sealant with minimum exposure to air using pressure gun with nozzle cut to fit joint width.
 - 7. Install sealant free of air pockets, foreign embedded material, ridges, and sags.
 - 8. Tool joints concave unless otherwise noted.
 - 9. Do not lap or feather onto adjacent surfaces.

3.10 ADJUSTING

- A. Remove and replace masonry units which are loose, chipped, broken, stained, or otherwise damaged, or if units do not match adjoining units as intended.
- B. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- C. Repoint all joints to provide a neat, uniform appearance.

3.11 FINAL CLEANING

- A. Clean exposed terra cotta by using water, detergent, and a natural or nylon bristle brush.
- B. All abrasive cleaning measures (sandblasting), the use of strong acids (fluoride-based acids), high-pressure water cleaning and the use of metal bristle brushes are prohibited.

3.12 FINISH

- A. Site apply clear masonry coating on weather face of terra cotta units.
- B. Where feasible, delay application of water repellents until installation of sealants has been completed in joints of adjoining surfaces to be coated with water repellent.

3.13 FIELD QUALITY CONTROL

- A. Manufacturer's field representative shall inspect terra cotta restoration and installation, identify defects, and submit report to Architect and Owner

- B. Correct deficiencies identified by manufacturer's field representative.
- C. After restoration is complete, inspect joints.
- D. Replace defective mortar.
- E. Match adjacent work.

3.14 PROTECTION AND CLEANUP

- A. During erection, cover uncompleted terra cotta and backing with waterproof sheeting at end of each day and hold securely in place.
- B. Protect face of adjacent walls and surfaces from water, mortar, and grout used for terra cotta installation.
- C. Remove excess mortar and mortar smears as work progresses.
- D. Clean soiled surfaces with detergent and clean water.
- E. Use fiber brushes and cloths.
- F. Do not use metallic tools.
- G. Protect terra cotta from subsequent construction operations.
- H. Remove and replace damaged components as required to provide terra cotta in original, undamaged condition.
- I. Refer to Division 7 for sacrificial (graffiti protection) coating.

END OF SECTION 04 01 80.51

SECTION 04 21 29

TERRA COTTA MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. New glazed architectural terra cotta.
- B. Related Sections:
 - 1. Section 04 01 80.51: "Terra Cotta Repair."
 - 2. Section 07 19 19: "Silicone Water Repellents."
 - 3. Section 07 92 0: "Joint Sealants"

1.2 REFERENCES

- A. National Concrete Masonry Association (NCMA).
- B. American Society for Testing and Materials (ASTM), C67, C126, and C212.

1.3 PERFORMANCE REQUIREMENTS

- A. Terra cotta to consist of modular, manufactured, fired clay pieces attached to structural substrate to form a weathertight veneer and ornamentation.
- B. Method of attachment shall be designed to adequately resist wind pressure, uplift, and other loads for project location.
- C. Method of installation and expansion joints shall accommodate stresses caused by deflection, settlement, wind pressure, and temperature changes without failure of joints, undue stress on fasteners, or other detrimental effects.

1.4 SUBMITTALS

- A. Product Data: Include material descriptions.
- B. Samples:
 - 1. 6 inches by 6 inches by full depth units illustrating range of colors and textures for clay body and glazed finish. Provide multiple units including field, corner, cap and ogee style.
 - 2. Mortar samples illustrating color.
 - 3. Sealant samples illustrating color.
- C. Shop Drawings: Show details of construction, profiles of pieces, ornamentation, dimensions, joints, flashings, sheet metal, reglets, anchors, connections, and installation details.
- D. Mock up: Coating re: 07 19 19.
- E. Mock up: Caulk sealant at skyward facing joints for review by Architect.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company with twenty years minimum successful experience manufacturing architectural terra cotta.
- B. Installer's Qualifications: Company with ten years minimum successful experience installing architectural terra cotta.
- C. Single Source Responsibility: Terra cotta pieces and required anchors shall be furnished by single manufacturer.
- D. Sole Installation Responsibility: Single installer shall install terra cotta pieces and anchors specified, sheet metal and flashings adjoining terra cotta, and sealants used for terra cotta expansion joints.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Prior to shipping, pack and crate terra cotta pieces to prevent damage during transit and storage.
- B. Schedule deliveries in sequence of installation.
- C. Inspect terra cotta immediately upon delivery at site and notify manufacturer of damage and non-conformity.
- D. Keep pieces in original packing material until ready to install.
- E. Protect from weather to prevent staining.
- F. Store and maintain crates in upright position; do not stack crates.

1.7 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Maintain materials and surrounding air temperature to minimum 40 degrees F. and maximum 90 degrees F. prior to, during, and forty-eight hours after completion of terra cotta work.
- B. Existing structure is an historic site wall and is located within an historic district. As such, noticeable modifications to the exterior are not permitted and demolition and restoration shall be conducted to comply with intent of Secretary of the Interior's Standards for Rehabilitation. Existing historic items of construction not indicated to be removed or restored, shall be protected during construction operations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Gladding McBean (basis of design – provided phase 1 and 2 terra cotta).
- B. Boston Valley Terra Cotta.

- C. An equivalent product of an approved manufacturer.

2.2 MATERIALS

- A. Terra-Cotta:
 - 1. Fired clay, modular pieces with glazed finish.
 - 2. Minimum averaged characteristics based on testing ten samples in accordance with referenced standards:
 - a. Compressive strength, ASTM C67 and ASTM C126: 6,000 PSI.
 - b. Shear Strength: 1,500 PSI.
 - c. Absorption, ASTM C67:
 - 1) Eleven-and-one-half percent after five hours boil.
 - 2) Seven-and-one-half percent after twenty-four hours soak.
 - d. Saturation coefficient, ASTM C67: 0.69.
 - e. Coefficient of thermal expansion: 0.0000025 inch/inch/degree F.
 - f. Craze resistance, AIA File No. 9: No crazing, spalling, or cracking after one cycle of autoclaving.
 - g. Glaze absorption, ASTM C67: Fifteen-one-hundredth percent.
 - h. Freeze-thaw resistance, ASTM C67: Three-hundred cycles without degradation.
 - i. Thermal shock resistance of glazed terra cotta, ASTM C484: Passes one test cycle.
 - j. Glaze adhesion, AIA File No. 9: 1,200 PSI.

2.3 DESIGN

- A. Design terra cotta pieces to satisfy performance requirements specified in Paragraph 1.3 above.
- B. Pieces shall be structurally sound with adequate provision for anchorage and setting
 - 1. Ceramic Veneer Panels: Thin, solid slabs with scored or ribbed backs with minimum thickness:
 - a. Adhesion Set Veneer: 1 inch.
 - b. Mechanically Anchored Veneer: 1-1/4 inches.
 - 2. Ornamental and Special Shapes:
 - a. Exposed Wall Faces: 1 inch.
 - b. Partitions: Thickness and spacing to provide required structural support.
 - c. Beds: 4 inches deep, minimum.
- C. Provide required anchor and hand holes.
- D. Provide projecting pieces with drips.
- E. Terra cotta veneer shall be continuously supported shelf supports rigidly connected to structural system.
- F. Shelf supports shall be located in mortar joints.
- G. Glazed Architectural Terra-Cotta
 - 1. Hollow unit, hand cast in molds or carved in clay, heavily glazed and fired.
 - 2. Sizes and shapes as indicated.

3. Color to match existing terra-cotta.

H. Joint Reinforcement: Stainless steel joint reinforcing at exterior wall assemblies.

I. Ties and Anchors:

1. Provide two-piece adjustable anchors which provide lateral restraint, but permit vertical and horizontal movement.
2. 3/16 inch cold-drawn steel wire, ASTM A82, of length required for proper embedment in wythes of masonry shown.

2.4 FABRICATION

- A. Fabricate terra cotta pieces in accordance with approved shop and setting drawings.
- B. Duplicate existing terra cotta pieces based on illustrative samples from existing building, photographs, measured drawings, and original building drawings.
- C. Produce molds for forming terra cotta pieces. Allow for clay shrinkage resulting from drying and firing.
- D. Form clay pieces by hand pressing, ram pressing, or extruding as determined by manufacturer as best method for shapes, sizes, and complexity of terra cotta. Hand finish pieces as required to produce high quality component.
- E. Dry pieces three to fourteen days using regulated temperature and humidity.

2.5 FINISH

- A. Finish: Terra cotta pieces shall be finished with colored glazes.
- B. Color and texture to match finish of existing cleaned terra cotta.
- C. Glaze: High-fired type spray applied to unfired piece and then fired to vitrify clay and fuse finish to terra cotta piece.
 1. Finish: Sheen to match existing cleaned terra-cotta.
 2. Color:
 - a. Color to match finish of existing cleaned terra cotta.

2.6 FIRING

- A. Fire pieces after application of high-fired glaze.
- B. Pieces shall be kiln fired at 2100 degrees F. in accordance with manufacturer's standard method to obtain characteristics specified in paragraph above.

2.7 SOURCE QUALITY CONTROL

- A. After fabrication and prior to packing for shipment, carefully inspect terra cotta pieces for chips, cracks, and other defects.
- B. Verify dimensions comply with shop drawing dimensions and finishes match approved samples.
- C. Verify pieces meet fabrication tolerances:

1. Warping for extruded terra cotta veneer: 0.005 inch per inch length maximum variation from true plane.
2. Tolerance for handmade terra cotta pieces: 1/8 inch maximum variation from shop drawing dimensions.

D. Shop Assembly:

1. Layout terra cotta pieces in accordance with setting drawings. Verify that joints when installed will be straight, true, and uniform width.
2. Verify that decorative elements continuous from one piece to next are aligned.
3. Notify Architect ten days prior to shop assembly.

E. Correct deficiencies.

2.8 MORTAR AND GROUT

A. Materials:

1. Portland cement ASTM C150, Type I, low alkali.
2. Lime: ASTM C207, Type S, hydrated.
3. Aggregates: Free of organic contaminants. Chloride ions not to exceed fifty parts per million:
 - a. Fine: ASTM C144 sand with color and texture to match aggregate used for original mortar.
 - b. Coarse: ASTM C404, 1/2 inch maximum diameter.
4. Water: Potable, clean, and free of deleterious amounts of acids, alkalis, and organic materials.

B. Mortar:

1. Mixes: Mortar for rebuilding existing terra cotta and repointing existing joints shall be mixed so that compressive strength does not exceed that of existing mortar and terra cotta.
2. Adjust the following requirements such that existing compressive strengths are not exceeded.
3. Mortars shall not contain calcium chloride or air-entraining agents.
 - a. General Repairs and Repointing: ASTM C270, Type O.
 - 1) Cement: One parts.
 - 2) Lime: Two parts.
 - 3) Sand: Nine parts.
 - b. Alternate at Weather Protected Areas: ASTM C270, Type K.
 - 1) Cement: One part.
 - 2) Lime: Three parts.
 - 3) Sand: Twelve parts.
4. Color:
 - a. Color to match cleaned mortar on existing wall.

C. Grout: ASTM C476, 2,500 PSI strength and 1/2 inch diameter maximum aggregate.

D. Design mix to accommodate field conditions.

E. Thoroughly mix mortar and grout ingredients in quantities needed for immediate use in accordance with ASTM C270 and ASTM C476.

- F. Do not use anti-freeze compounds. Do not use admixtures without approval of Architect.
- G. Use mortar and grout within two hours after mixing.

2.9 ACCESSORIES

- A. Sealant: Type as recommended by terra cotta manufacturer.
 - 1. Maximum movement: twenty-five percent expansion and contraction.
 - 2. Joint size limitation:
 - a. Width: 1/4 to 1 inch.
 - b. Depth: 1/4 to 1/2 inch.
 - 3. Color: Shall match mortar color.
 - 4. Caulk all skyward facing joints.
- B. Joint backer rod: Round closed cell polyurethane rod oversized thirty percent larger than joint width.
- C. Terra cotta patching compound: Mortar type patching compound as recommended by terra cotta manufacturer.
- D. Angles, channels, and other secondary support members that are not part of structural frame: Rolled steel sections, ASTM A36.
- E. Anchors, hangers, bolts, clips, straps, rods, pins, clamps, and other metal items for securing terra cotta: Stainless steel, ASTM A167, Type 304 or galvanized steel, ASTM A123 of following minimum sizes.
 - 1. Terra cotta courses supported directly on wall: 1/4 inch by 1/4 inch or 1/8 inch by 5/8 inch anchors.
 - 2. Projecting terra cotta courses: 5/8 inch diameter bars.
 - 3. Hangers: 5/8 inch diameter.
 - 4. Clips and straps: 3/8 inch by 2 inches.
 - 5. Pins: 1/2 inch diameter.
 - 6. Continuous rods to receive terra cotta anchor clips: 5/8 inch diameter bars secured to structure with 1/2 inch diameter anchors at 24 inches maximum.
- F. Weep holes: Preformed plastic tubes.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Conduct site survey of existing building prior to submittal of shop drawings and fabrication of terra cotta pieces.
- B. Identify and code pieces to be replaced.
- C. Collect measurements, take photographs, make field sketches, and record other data as required for design and fabrication of replacement pieces.
- D. Sample and determine compressive strength of existing mortar. Identify joints to be re-pointed.
- E. Identify existing terra cotta surfaces to be cleaned.

F. Illustrative samples:

1. Carefully remove existing terra cotta pieces required as samples to use in preparation of molds for fabrication of replacement pieces.
2. Pack, crate, and delivery samples to manufacturer's plant.
3. Provide temporary protection to prevent moisture penetration into structure where terra cotta pieces are removed.

3.2 COORDINATION

- A. Coordinate requirements for steel support members, embedded anchors, flashings, and sheet metal with other work to ensure timely and accurate placement.

3.3 PRE-INSTALLATION CONFERENCE

- A. Convene a pre-installation conference prior to commencing work of this Section.
- B. Require attendance of entities directly concerned with work related to terra cotta restoration.
- C. Notify Architect five days in advance of meeting.
- D. Review:
 1. Items of restoration to be performed, procedures, and work sequence.
 2. Requirements for steel support members and embedded anchors.
 3. Coordination with installation of flashings and sheet metal.
 4. Protection of installed items and finishes.
 5. Availability of materials.
 6. Preparation of substrate.
- E. Record minutes, and distribute copies within five days to Architect, Owner, and other participants.

3.4 CLEANING EXISTING TERRA COTTA

- A. Clean all existing terra cotta surfaces.
- B. Protect areas below cleaning operation.
- C. Clean with detergent and clean water using fiber brushes and cloths.
- D. Do not use metallic tools for cleaning and scraping.
- E. Thoroughly rinse and wash off cleaning solution and dirt.

3.5 RE-POINTING

- A. Re-point all existing mortar joints.
- B. Cut out loose and disintegrated mortar in joints to minimum 1/2 inch depth or until sound mortar is reached.

- C. Use tools and methods that do not damage terra cotta.
- D. Remove dust and loose material by brushing, water spray, or air jet.
- E. Moisten joint.
- F. Tightly pack new mortar in 1/4 inch layers.
- G. Form smooth, compact joint to match existing.
- H. Moist cure for seventy-two hours.

3.6 REPAIRING

- A. Repair chipped and broken terra cotta pieces identified by inspection specified above.
- B. Remove loose material and clean surfaces to be repaired.
- C. Apply patching compound in accordance with manufacturer's instructions.
- D. Sculpt material to match existing profiles and ornamental designs.
- E. Provide smooth transition between new and existing surfaces.
- F. After compound has set and cured, apply primer and two finish paint coats.
- G. Blend and distress paint to match appearance and color of existing terra cotta.

3.7 REMOVAL FOR REBUILDING

- A. Cut out deteriorated terra cotta pieces to be replaced in manner to prevent damage to remaining terra cotta and adjoining materials.
- B. Cut away loose or unsound adjoining mortar and grout to provide clean surfaces and solid bearing for setting new pieces.

3.8 INSTALLATION OF NEW TERRA COTTA

- A. Install new terra cotta pieces in accordance with manufacturers recommended instructions and approved shop and setting drawings.
- B. Preparation:
 - 1. Securely attach anchors, hangers, bolts, clips, rods, and pins as required for securing terra cotta pieces.
 - 2. Use type of fastener and spacing recommended by terra cotta manufacturer.
 - 3. Ensure items are properly sized and accurately located.
 - 4. Soak walls to receive new terra cotta by spraying with clean water at beginning of day and again within one hour of setting pieces.
 - 5. Soak terra cotta pieces sixty minutes prior to installation.
- C. Field cutting:

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1. Where cutting is required to accommodate non-standard conditions, use power saw with abrasive or diamond blade and rigid cutting templates.
 2. Do not reduce strength of terra cotta by cutting webs and partitions.
- D. Set terra cotta plumb, true, and aligned.
- E. Maintain courses to uniform dimension.
- F. Projecting terra cotta shall be aligned and uniform such that shadow cast is true line.
- G. Anchor installation method:
1. Attach new terra cotta pieces to substrate with metal anchors as detailed on approved shop and setting drawings.
 2. Set pieces in solid mortar bed.
 3. Fill all spaces between terra cotta and substrate with grout or mortar.
 4. Spaces greater than 3/4 inch: Fill with grout.
 5. Spaces 3/4 inch or less: Fill with mortar.
- H. Adhesion installation method:
1. Immediately before application of mortar, brush coat of Portland Cement and water on back of terra cotta piece and on portion of wall to receive terra cotta.
 2. Spread mortar on back of terra cotta piece and portion of wall to receive piece such that total mortar thickness averages 3/4 inch.
 3. Tap piece in place completely filling voids and extruding slight excess at joints and edges.
- I. Open back terra cotta shapes shall be filled solidly with grout prior to installation.
- J. Allow grout to set enough to permit handling.
- K. Ensure that all rebates in bed and cross joints on sides and back are filled solid with mortar.
- L. Leave no voids.
- M. Adjustments:
1. Do not shift or tap terra cotta pieces after mortar has achieved initial set.
 2. If adjustments are required or pieces are disturbed after setting, remove, clean, and relay with fresh mortar.
- N. Grouting:
1. Fill terra cotta formed cavities containing reinforcement and other locations indicated on approved shop and setting drawings with grout.
 2. Place and consolidate grout without displacing reinforcement.
 3. Ensure that steel reinforcement, supports, anchors, and ties are encased with grout or mortar and permanently protected from corrosion.
- O. Weep holes:
1. Provide weep holes through mortar joints as indicated on approved shop and setting drawings.
 2. Keep weep holes free of mortar and grout.

3.9 JOINTS

- A. Mortar Joints:
 - 1. Size: 1/4 inch wide unless otherwise indicated on approved shop and setting drawings.
 - 2. Form vertical and horizontal joints of uniform thickness to match existing.
 - 3. Point joints as work progresses.
 - 4. When re-pointing is required, rake joint 3/4 inch, drive pointing mortar into joint, and strike with jointing tool.
 - 5. Joints in overhanging pieces, balustrades, parapets, and free standing terra cotta features.
 - 6. Rake out 3/4 inch and point with joint backing and sealant.
- B. Expansion joints: Provide expansion joints in linear terra cotta runs, at shelf supports, and other locations indicated on approved shop and setting drawings to accommodate deflection, thermal changes, and settlement.
 - 1. Maximum distance between expansion joints: 25 feet.
 - 2. Rake out expansion joints to full depth of setting bed at time terra cotta is installed.
 - 3. Install joint backing with blunt instrument.
 - 4. Do not twist rod.
 - 5. Backing shall be 1/4 inch from terra cotta surface.
 - 6. Apply sealant with minimum exposure to air using pressure gun with nozzle cut to fit joint width.
 - 7. Install sealant free of air pockets, foreign embedded material, ridges, and sags.
 - 8. Tool joints concave unless otherwise noted.
 - 9. Do not lap or feather onto adjacent surfaces.

3.10 FIELD QUALITY CONTROL

- A. Manufacturer's field representative shall inspect terra cotta restoration and installation, identify defects, and submit report to Architect and Owner.
- B. Correct deficiencies identified by manufacturer's field representative.
- C. After restoration is complete, inspect joints.
- D. Replace defective mortar.
- E. Match adjacent work.

3.11 PROTECTION AND CLEANUP

- A. During erection, cover uncompleted terra cotta and backing with waterproof sheeting at end of each day and hold securely in place.
- B. Protect face of adjacent walls and surfaces from water, mortar, and grout used for terra cotta installation.
- C. Remove excess mortar and mortar smears as work progresses.
- D. Clean soiled surfaces with detergent and clean water.
- E. Use fiber brushes and cloths.
- F. Do not use metallic tools.

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- G. Protect terra cotta from subsequent construction operations.
- G. Remove and replace damaged components as required to provide terra cotta in original, undamaged condition.
- H. Refer to Division 07 for sacrificial (graffiti protection) coating.

END OF SECTION 04 21 29

EXHIBIT K

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SECTION 07 19 19**SILICONE WATER REPELLENTS****PART I - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Sacrificial coating for terra-cotta (graffiti control).
- B. Related Sections:
 - 1. Section 04 01 80.51: "Terra Cotta Repair."
 - 2. Section 04 21 29: "Terra Cotta Masonry."

1.2 SUBMITTALS

- A. Product Data:
 - 1. Include manufacturer's specifications, surface preparation and application instructions.
 - 2. Recommendations for water repellents for each surface specified, and protection and cleaning instructions.
 - 3. Include data substantiating that materials are recommended by manufacturer for applications indicated and comply with requirements.
- B. Material Test Reports: Submit from qualified independent testing agency indicating and interpreting test results for compliance of water repellents with performance requirements specified in "Quality Assurance" Section.
- C. Anticipate a minimum of two (2) rounds of mock-up of the repellant for approval by Architect and Owner.

1.3 QUALITY ASSURANCE

- A. Manufacturer shall verify application procedures including:
 - 1. Coverage rate.
 - 2. Temperature and site conditions.
 - 3. Conformance with manufacturer's recommendations.
- B. Performance Requirements:
 - 1. Indicate test results for water repellents on substrate simulating Project conditions, as close as possible.
 - 2. Use same materials and methods of application to be used on Project:
 - 3. Absorption Tests: Comparison of treated and untreated specimens.
 - 4. Water Vapor Transmission: ASTM E 96: Comparison of treated and untreated specimens.
 - 5. Water Penetration and Leakage Through Masonry: ASTM E 514.

1.4 PROJECT CONDITIONS

- A. Weather and Substrate conditions: Do not exceed with application of water repellent (except with written recommendations of manufacturer) under any of following conditions:
 - 1. Ambient and substrate temperature is less than 40 degrees F.
 - 2. Substrate surfaces have cured for less than one month.

3. Rain or temperatures below 40 degrees F. are predicted for a period of twenty-four hours.
4. Earlier than twenty-four hours after surfaces become wet.
5. Substrate is frozen or surface temperature is less than 40 degrees F.
6. Windy condition such that repellent may be blown to vegetation or substrates not intended.

1.5 WARRANTY

- A. Submit a written warranty, executed by Applicator and water repellent manufacturer covering materials and labor, agreeing to repair or replace materials that fail to prove water repellent within specified warranty period.
- B. This warranty shall be in addition to, and not a limitation of, other rights Owner may have against contractor under contract documents.
- C. Warranty Period: Five years from date of Substantial Completion.
- D. Must pass Rilem Test-wind driven rain 59 MPH.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Silicone Elastomer:
 1. Protectosil Aqua-Trete SG: Stain-resistance and sacrificial antigraffiti treatment.
 2. Equivalent product of an approved manufacturer.

PART 3 - EXECUTION

1.1 PREPARATION

- A. All masonry surfaces shall be cleaned and free of excess dust, dirt, mortar, etc.
- B. Cracks and/or damage areas shall be patched and allowed to dry thoroughly before waterproofing.
- C. Masonry areas shall be thoroughly dry before application.

3.2 APPLICATION

- A. Apply concentrated solutions only as per manufacturer's instructions.
- B. Apply with low pressure (airless type) spray equipment.
- C. Application shall be in two steps.
- D. Apply to all terra-cotta and synthetic terra-cotta and above-grade exposed portion of concrete foundation.
- E. Coverage rate shall conform to manufacturer's recommendation for specific type of masonry to be treated.
- F. Wrought iron gate and other conjunctive non-masonry shall be protected from any overspray, leaving surfaces in a clean and acceptable condition.

- G. Remove protective coatings from adjacent surfaces.

3.3 CLEANING AND PROTECTION

- A. Remove any masking materials after installation.
- B. Clean any stains on materials that would be exposed in completed work.
- C. Protect completed water repellent coating from subsequent construction activities as recommended by manufacturer.

END OF SECTION 07 19 19

EXHIBIT K

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SECTION 07 92 00**JOINT SEALANTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Elastomeric joint sealants.
 - 2. Silicone joint sealants.
- B. Related Sections:
 - 1. Section 03 30 00: "Cast in Place Concrete"
 - 2. Section 04 01 20.91: "Unit Masonry Restoration."
 - 3. Section 04 01 80.51: "Terra Cotta Repair."
 - 4. Section 04 21 29: "Terra Cotta Masonry."

1.2 SYSTEM DESCRIPTION

- A. Provide joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.
- B. Provide joint sealants for exterior applications that have been produced and installed to establish and maintain airtight continuous seals that are water resistant and cause no staining or deterioration of joint substrates.

1.3 SUBMITTALS

- A. Product Data: Manufacturers printed data for each joint sealant product required.
- B. Samples:
 - 1. Manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.
 - 2. Provide a sample joint for approval, 8 inches long minimum, in each material condition present on project.
- C. Mock-Up: Provide for each typical installation for review by Architect and Owner prior to proceeding with sealant work.

1.4 QUALITY ASSURANCE

- A. Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.

- B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealants under following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
 - 2. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or below 40 degrees F.
 - 3. When joint substrates are wet.
- B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than or greater than allowed by joint sealant manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.
- D. Install sealants at substrate temperatures as near as possible to 55 degrees F. to help balance extension and compression of sealants in exterior working joints.

1.7 SEQUENCING AND SCHEDULING

- A. Sequence installation of joint sealants to occur not less than twenty-one nor more than thirty days after completion of waterproofing.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Provide materials as manufactured by following:
 - 1. Backer Rod Manufacturing and Supply Company, Denver, Colorado.
 - 2. Dow Chemical Company, Midland, Michigan.
 - 3. Dow Corning Corporation, Midland, Michigan.
 - 4. General Electric Company, Waterford, New York.
 - 5. Pecora Corporation, Harleysville, Pennsylvania.
 - 6. Sika Chemical Corporation, Lyndhurst, New Jersey.
 - 7. Sonneborn-Contech, Minneapolis, Minnesota.
 - 8. Tremco, Cleveland, Ohio.
 - 9. Williams Products, Inc., Troy, Michigan.

2.2 MATERIALS

- A. Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Provide color of exposed joint sealants as selected by Architect from manufacturer's full range of standard colors for products of type indicated.
- C. Exterior Sealants:

1. Vertical Surfaces:
 - a. Silicone or urethane.
 - b. ASTM C920, Type S, Grade NS, Class 25, Use M, A, or O, as applicable.
 2. Skyward facing terra cotta joints:
 - a. Dow Corning 795, Silicone: color to match the mortar joint color.
 - b. Or approved equal.
 3. Horizontal Surfaces in Traffic Areas:
 - a. Urethane.
 - b. ASTM C920, Type S or M, Grade P, Class 25, Use T.
 - c. Grade NS, Use T, in areas with slopes exceeding one percent.
- D. Joint Fillers:
1. ASTM, Type A, rod stock closed cell polyethylene foam, closed cell neoprene foam, or open cell urethane foam, recommended by sealant manufacturer for compatibility with sealant.
 2. Polyethylene: Ethafoam SB, as manufactured by Dow Chemical Company.
 3. Neoprene: Neocord, as manufactured by Williams Products.
 4. Urethane: Denverfoam, as manufactured by Backer Rod Manufacturing and Supply.
- E. Bond Breaker Tape: Colored polyethylene pressure sensitive tape, minimum thickness 0.012 inch.
- F. Primer:
1. Use primer if sealant manufacturer recommends it for anticipated substrates and environmental conditions.
 2. If manufacturer or Architect decides that adhesion tests are necessary to determine primer use, send substrate samples to sealant manufacturer with copy of transmittal to Architect.
 3. Testing will be paid for by Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance.
- B. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Joint Surface Cleaning:
 1. Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer.
 2. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 3. Clean concrete, masonry, terra cotta, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.

- B. Joint Priming:
 - 1. Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience.
 - 2. Apply primer to comply with joint sealant manufacturer's recommendations.

3.4 APPLICATION

- A. Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Install sealants in accordance with ASTM C1193.
- C. Install latex sealants in accordance with ASTM C790.
- D. Install elastomeric sealants in accordance with ASTM C962.
- E. Sealant Backing Installation: Install joint fillers of type indicated to provide support of sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability; and install without gaps.
- F. Sealant Installation: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- G. Non-Sag Sealant Tooling:
 - 1. Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint.
 - 2. Remove excess sealants from surfaces adjacent to joint.
 - 3. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
 - 4. Provide concave joint configuration per Figure 5A in ASTM C 1193.
- H. Remove and reinstall joints which do not conform to approved samples.

3.5 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion.
- B. Cut out and remove damaged or deteriorated joint sealants immediately so that installations with repaired areas are indistinguishable from original work.

EXHIBIT K

Sullivan Gateway
Anderson Hallas Architects, PC

Joint Sealants
07 92 00 - 5

END OF SECTION 07 92 00

EXHIBIT K

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SECTION 26 01 00

ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.01 PROVISIONS

- A. Drawings, general provisions of the Contract, any General and Supplementary Conditions to the Contract, provisions of applicable Subcontractor Agreements, and other Division 1 Specification sections apply to work of this section.

1.02 DESCRIPTION

- A. Furnish and install all materials and equipment and provide all labor required and necessary to complete the work shown on drawings and/or listed below and all other work and miscellaneous items, not specifically mentioned, but reasonably inferred for a complete installation, including all accessories and appurtenances required for testing the system. It is the intent of Drawings and Specifications that all systems be complete and ready for operation.

1.03 WORK INCLUDED

- A. Provide new exterior light fixtures and lighting control fed from an existing panel in the existing east vault. This includes underground conduit and branch circuits.
- B. Certain labor, materials and/or equipment may be furnished under other Sections, or by Owner. When such is the case, extent, source and description of these items shall be indicated on drawings or described herein. Unless otherwise noted, all labor, materials, and/or equipment for complete installation of electrical work shall be provided under this Division.

1.04 DEFINITIONS

- A. Instructions such as "Provide the outlets" shall mean the same as through the words "This Contractor shall" preceded each such instruction. "Provide" shall mean "Furnish and Install". Where the words "Accepted or Acceptable" are used, such "Accepted" or "Acceptable" action by the Engineer denotes that the work or equipment item is in conformance with the design concept of the project and, in general complies with pertinent information given in the Contract Documents.

1.05 STANDARDS FOR MATERIALS

- A. All materials shall conform with current applicable industry standards. Workmanship and neat appearance shall be as important as electrical and mechanical operation. Defective or damaged materials shall be replaced or repaired prior to final acceptance

in a manner meeting approval of Engineer and at no additional cost to Owner.

B. The latest editions of the following standards are minimum requirements.

1. Underwriters' Laboratories, Inc. (UL)
2. National Electrical Manufacturer's Association (NEMA)
3. American National Standards Institute (ANSI)
4. Insulated Cable Engineer's Association (ICEA)
5. Institute of Electrical and Electronic Engineers (IEEE)

1.06 SUBSTITUTION OF EQUIPMENT AND MATERIALS

A. No substitutions of equipment without written approval from the Engineer, all substitution submittals must be received by the Engineer 7 days prior to the bid.

1.07 CODE COMPLIANCE

- A. All work and materials shall comply with latest rules, codes and regulations, including but not limited to the following: OSHA, National Fire Codes of National Fire Protection Association (NFPA), 2017 National Electrical Code and all other applicable State and local laws and regulations.
- B. Code compliance is mandatory. The Drawings and Specifications shall not permit work that does not conform to these codes.

1.08 DRAWINGS

- A. Drawings indicate general arrangement of circuits and outlets, locations of switches, panelboards and other work. Drawings and specifications are complementary each to the other, and what is called for by one shall be binding as if called for by both. Data presented on drawings is as accurate as planning can determine, but accuracy is not guaranteed and field verification of all dimensions, locations, levels, etc. to suit field conditions is directed. Review all drawings, and adjust all work to conform to all conditions shown therein. Discrepancies between different drawings or between drawings and specifications or regulations and codes governing installation shall be brought to the attention of the Engineer.

PART 2 - PRODUCTS

2.01 EQUIPMENT AND MATERIALS

- A. All equipment and materials installed shall be new and UL approved unless otherwise specified.

- B. All major equipment components shall have manufacturer's name, address, model number and serial number permanently attached in a conspicuous location.

PART 3 - EXECUTION

3.01 CONDITIONS AT SITE

- A. Visit to site is required of all bidders prior to submission of bid. All will be held to have familiarized themselves with all discernible conditions, and no extra payment will be allowed for work required because of these conditions, whether specifically mentioned or not.
- B. Lines of other services that are damaged as a result of this work shall promptly be repaired at no expense to Owner to complete satisfaction of Engineer.

3.02 LICENSE, FEES, AND PERMITS

- A. Arrange for required inspections for all license, permit and inspections. Furnish a certificate of final inspections and approval from local authority having jurisdiction over electrical installation.

3.03 WORKMANSHIP AND CONTRACTOR'S QUALIFICATIONS

- A. Only quality workmanship will be accepted. Haphazard or poor installation practice will be cause for rejection of work. A journeyman to apprentice ratio of 1:3 must be maintained.
- B. Provide foreman in charge of this work at all times and submit a resume for the proposed foreman including references and recent work experience.

3.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Division 1.
- B. Prior to submission, shop drawings, material lists and catalog cuts or manufacturer's printed data shall be thoroughly checked for compliance with contract requirements, compatibility with equipment being furnished by the Contractor or Owner, accuracy of dimensions, coordination with work of other trades, and conformance with sound and safe practice as to erection of installation. Each submittal shall bear Contractor's signed statement evidencing such checking.
- C. Clearly mark each shop drawing as follows for purposes of identification:

Shop Drawing
Equipment Identification Used on Contract Drawings

EXHIBIT K

Date
Name of Project
Branch of Work
Architect/Engineer's Name
Contractor's Name

- D. Clearly mark printed material, catalog cuts, pamphlets or specification sheets, and shop drawings with the same designation shown on the contract document schedules. Identify specific item proposed, showing catalog number, recess openings, dimensions, capacities, electrical characteristics, etc. Submittals which are incomplete will be returned to the Contractor without review.
- E. Contractor agrees that submittals processed by the Architect/Engineer are not change orders; that the purpose of submittals is to demonstrate to the Architect/Engineer that the Contractor understands the design concept; and that the Contractor demonstrates this understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use.
- F. Contractor shall be responsible for dimensions (which he shall confirm and correlate at the job site), fabrication processes and techniques of construction, and coordination of his work with that of other trades. The Contractor shall check and verify all measurements and review shop drawings before submitting them. If any deviations from the specified requirements for any item of material or equipment exist, such deviation shall be expressly stated in writing and incorporated with the submittal.
- G. Maintain one copy of shop drawings at the project field office until completion of the project, and make this copy available, upon request, to representatives of the Architect/Engineer and Owner.
- H. No equipment or materials shall be installed or stored at the jobsite until submittals for such equipment or materials have been given review action permitting their use.
- I. Shop drawings and manufacturer's published data shall be submitted for:

Light fixtures (catalog cuts)

3.05 TESTS

- A. The right is reserved to inspect and test any portion of the equipment and/or materials during the progress of its erection. This contractor shall test all wiring and connections (whether new or existing) for continuity and grounds before connecting any equipment.

3.06 DELIVERY AND STORAGE OF MATERIALS

- A. Make provisions for delivery and safe storage of all materials. Deliver materials to job as such stages of the Work as will expedite Work as a whole. Carefully mark and

store all materials. Carefully check materials furnished for installation, and furnish a receipt acknowledging acceptance of delivery and condition of materials received. Thereafter assume full responsibility for safekeeping of same until final installation has been approved and accepted.

3.07 DIRECTORY CARDS, NAMEPLATES, AND LABELS

- A. All components of electrical system shall be neatly and accurately labeled to facilitate ready identification and service. Temporary type of markings, which are visible on equipment, will not be permitted. Repaint trims, housing, etc. where such marking cannot be readily removed. Defaced finish must be refinished. All spares or spaces must be labeled in erasable pencil.

3.08 CLEAN-UP

- A. Remove all materials, scrap, etc. relative to the electrical installation and leave the premises in a clean and orderly condition. Any costs to Owner for cleanup of site will be charged to Contractor. At completion, all equipment, lighting fixtures, etc. shall be thoroughly cleaned and all residue removed from the inside and outside surfaces. Defaced finishes shall be refinished.

3.09 GUARANTEE

- A. Provide in accordance with the General Conditions and Division 1. Leave entire electrical system installed under this Division in proper working order. Replace, without additional charge, any work materials or equipment provided under this Division which develops defects within one year from date of final acceptance. Guarantee all materials and equipment against defects in composition, design or workmanship.

END OF SECTION

EXHIBIT K

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SECTION 26 05 26

GROUNDING

PART 1 - GENERAL

1.01 RELATED WORK IN OTHER SECTIONS

- A. Section 26 01 00 General Provisions; Section 26 11 00 Raceways; Section 26 12 00 Conductors; Section 26 13 00 Boxes and Fittings.

PART 2 - PRODUCTS

- A. Materials, equipment, and devices related to the grounding system are specified under other sections of these specifications.

PART 3 - EXECUTION

3.01 GENERAL

- A. Install grounding conductors and ground the new service as shown on the drawings and as required by the 2017 NEC.
- B. Provide a grounding conductor in all power and lighting branch circuits.

3.02 EQUIPMENT GROUNDING SYSTEM

- A. Branch Circuits: Provide a separate green insulated equipment grounding conductor for each branch circuit. Install a grounding conductor in the common conduit or raceway with the related phase and/or neutral conductors and connect to the box or cabinet grounding terminal.
- B. Devices: Install a minimum No. 12 green insulated equipment bonding conductor from a grounding terminal in the respective outlet or junction box to the green ground terminal of all receptacles and through flexible conduit to all light fixture housings.

3.03 GROUND CONNECTIONS

- A. Clean surfaces thoroughly before applying ground lugs or clamps. If surface is coated, the coating must be removed down to the bare metal. After the coating has been removed, apply a noncorrosive approved compound to cleaned surface and install lugs or clamps. Where galvanizing is removed from metal, it shall be painted or touched up with "Galvanox," or equal.

END OF SECTION

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SECTION 26 11 00

RACEWAYS

PART 1 - GENERAL

1.01 RELATED WORK IN OTHER SECTIONS

- A. Section 26 01 00 General Provisions; Section 26 05 26 Grounding.

1.02 RELATED DOCUMENTS

- A. Drawings, general provisions of the Contract, any General and Supplementary Conditions to the Contract, provisions of applicable Subcontractor Agreements, and other Division 1 Specification sections apply to work of this section.

PART 2 - PRODUCTS

2.01 CONDUITS

- A. Rigid Steel Conduit: Rigid, threaded, thick-wall, zinc-coated on the outside and either zinc-coated or coated on the inside. ANSI C80.1.
- B. Electrical Metallic Tubing (EMT): Mild steel, zinc-coated on the outside and either zinc-coated or coated with an approved corrosion-resistant coating on the inside.
- C. Flexible Non-metallic Conduit: Liquidtight with a separate grounding bond wire installed in the conduit in addition to other wires.
- D. PVC Conduit: Schedule 40, 1" minimum.
- E. Conduit Size: All conduits shall be as required by the NEC.
- F. Flexible metallic, AC or MC cable may not be used.

2.02 CONDUIT FITTINGS

- A. Rigid Steel Conduit, IMC, and EMT Fittings: Iron or steel only.
- B. Connectors and Couplings: Compression type threadless fittings for rigid steel conduit or IMC not permitted. Steel set screw connectors and couplings permitted for special conditions when approved. EMT couplings and connectors steel only, "Concrete-tight" or "Rain-tight," the gland and ring compression type or double set screw type. Connectors shall have insulated throats.
- C. Bushings: Insulated type, designed to prevent abrasion of wires without impairing the

continuity of the conduit grounding system, for rigid steel conduit, IMC, and rigid aluminum conduit larger than 1/2-inch size. Provide grounding type bushings on all feeder conduits.

PART 3 - EXECUTION

3.01 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

- A. Size conduit to meet requirements of National Electrical Code.
- B. Route exposed conduit parallel and perpendicular to walls and adjacent piping.
- C. Maintain minimum 6 inch clearance between conduit and piping. Maintain 12 inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.
- D. Arrange conduit supports to prevent distortion of alignment by wire pulling operations.

3.02 CONDUIT INSTALLATION

- A. Cut conduit square using a saw or pipecutter; de-burr cut ends.
- B. Bring conduit to the shoulder of fittings and couplings and fasten securely.
- C. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations.
- D. Use conduit bodies to make sharp changes in direction, as around beams.
- E. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.
- F. Where conduit penetrates fire-rated walls and floors, provide mechanical fire-stop fittings with UL listed fire rating equal to wall or floor rating or seal opening around conduit with UL listed foamed silicone elastomer compound.
- G. Where conduit penetrates waterproofed floors or exterior walls subject to entry of moisture (such as the east vault), provide pipe sleeves two sizes larger than conduit, suitably flashed or sealed where appropriate. Seal annular space around conduit with UL listed foamed silicone elastomer compound. For conduit penetrations through exterior foundation walls below grade, all conduit shall be sloped away from the building to prevent entry of moisture. Pipe sleeve shall be large enough to allow up to 3" of vertical movement about the conduit without damage in the event that the foundation rises.
- H. Provide grounding type bushings around all conduits terminated through concentric or eccentric knockouts.

3.03 CONDUIT INSTALLATION SCHEDULE

- A. Exposed Dry Interior Locations (new vaults): Rigid steel conduit or electrical metallic tubing or liquidtight flex. Do not use EMT in concrete slabs, in block or concrete walls or where it is exposed to the weather.
- B. Direct Buried Locations: PVC conduit a minimum of 24" below finished grade. PVC conduit shall never be exposed and shall be transitioned to GRC prior to stubbing up in concrete or earth.
- C. Exposed wet exterior location: Rigid steel conduit shall be painted to match the building.

END OF SECTION

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SECTION 26 12 00

CONDUCTORS

PART 1 - GENERAL

1.01 RELATED WORK IN OTHER SECTIONS

- A. Section 26 01 00 General Provisions; Section 26 05 26 Grounding.

1.02 RELATED DOCUMENTS

- A. Drawings, general provisions of the Contract, any General and Supplementary Conditions to the Contract, provisions of applicable Subcontractor Agreements, and other Division 1 Specification sections apply to work of this section.

PART 2 - PRODUCTS

2.01 CONDUCTORS AND CABLES (600 VOLTS)

- A. Type: Conform to the applicable UL and ICEA Standards for the use intended. Copper conductors with 600-volt insulation unless otherwise specified or noted on the drawings. Stranded conductors for No. 10 and larger.
- B. Aluminum Conductors Prohibited: Aluminum conductors will not be permitted.
- C. Insulation: Type THWN/THHN insulation minimum unless otherwise specified or noted on the drawings. Type THW minimum or type XHHW filled cross-linked polyethylene 90-degree C thermosetting insulation for conductors larger than No. 6 and elsewhere as required by NEC.
- D. Size: No. 12 minimum unless otherwise specified or noted on the drawings. Not less than NEC requirements for the system to be installed. If the equipment to be installed requires larger conductor and equipment sizes than indicated on the drawings, the required changes shall be made without additional charge to the Owner.
- E. Wire Color Coding: Color code wires for building voltage classes as follows:

120/208V-3 Phase	277/480V-3 Phase
A - Black	A - Brown
B - Red	B - Orange
C - Blue	C - Yellow
Neutral - White	Neutral - Gray
Ground - Green	Ground - Green

2.04 CONNECTORS AND LUGS

- A. For copper conductors No. 10 and smaller: 3M Scotch-Lok, T&B or equal spring wire connectors.
- B. For copper conductors larger than No. 10: Split bolt-type pressure connectors, properly taped or insulated.

PART 3 - EXECUTION

3.01 SPLICES (480 VOLTS AND UNDER)

- A. Permitted only at outlets or accessible enclosures. Conductor lengths shall be continuous from termination to termination without splices unless approved by the Architect/Engineer.

3.02 RACEWAYS

- A. Install all conductors in an approved raceway system.
- B. Install a ground conductor in all power & lighting circuits.

3.03 CABLE BENDS

- A. Radius of bends shall be not less than 10 times the outer diameter of the cable.

END OF SECTION

SECTION 26 13 00

BOXES AND FITTINGS

PART 1 - GENERAL

1.01 RELATED WORK IN OTHER SECTIONS

- A. Section 26 01 00 General Provisions; Section 26 05 26 Grounding.

1.02 RELATED DOCUMENTS

- A. Drawings, general provisions of the Contract, any General and Supplementary Conditions to the Contract, provisions of applicable Subcontractor Agreements, and other Division 1 Specification sections apply to work of this section.

PART 2 - PRODUCTS

2.01 OUTLET BOXES

- A. Size: To accommodate the required number and sizes of conduits, wires and splices in accordance with NEC requirements, but not smaller than 4" square. Special purpose boxes shall be sized for the device or application indicated.
- B. Exposed: Screw-joint type, cast FS boxes with gasketed weatherproof covers in the two new vaults.
- C. Wall-Mounted Switch, Receptacle and Signal Boxes: Unless otherwise noted or specified, not less than 4 inches square by 1-1/2 inches deep for two devices and multgang boxes for more than two devices.

PART 3 - EXECUTION

3.01 OUTLET BOXES

- A. Installation: Unless otherwise specified or shown on the drawings, outlet boxes shall be surface mounted within the new vaults. Mount boxes with the long axes of devices vertical, unless otherwise specified. Box extensions and/or covers will not be permitted. Install in a rigid and satisfactory manner with suitable metal bar hangers, box cleats, adjustable box hangers, etc.
- B. Mounting Heights: The mounting height of a wall-mounted outlet box shall be construed to mean the height from the finished floor to the horizontal center line of the cover plate. On exposed tile, block, or brick construction, mount outlet boxes at the nearest bed joint to the mounting height indicated. Verify with Architect.

END OF SECTION

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SECTION 31 20 00**EARTH MOVING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes the requirements for excavation, re-grading, stripping and stockpiling of topsoil, filling, backfilling, compaction, hauling, and legal off-site disposal of spoil materials to meet the required lines and grade as specified to complete the work.
- B. Related Sections:
 - 1. Division 01 Section "Erosion and Sedimentation Control".
 - 2. Division 01 Section "Tree Retention and Protection".
 - 3. Division 32 Section "Topsoil".

1.3 DEFINITIONS

- A. Excavation: The removal of material encountered to subgrade or over-excavation and subsequent disposal or placement of materials removed.
- B. Unclassified Excavation: The term "unclassified excavation", as used herein, includes the excavation of all materials required for the work obtained within construction limits of project, including bedrock, surface boulders, wasted sections of concrete, asphalt or other debris including historic landfills that may be encountered. All excavation will be considered unclassified regardless of the nature of material encountered.
- C. Classified Excavation: The term "classified excavation", as used herein, defines the soil conditions that are expected to be encountered and makes provisions for measurement and payment of any rock encountered at an agreed upon unit price.
- D. Unauthorized Excavation: Inadvertent or purposely removing materials beyond indicated subgrade elevations or dimensions without specific direction of the Project Manager. Unauthorized excavation, as well as remedial work resulting from unauthorized excavation shall be at Contractor's expense.
- E. Unsuitable Materials: For the purposes of classified excavation, unsuitable material shall be defined as material below subgrade elevation that exhibits excessive pumping or that does not meet density requirements due to unsatisfactory material as determined by geotechnical engineer and/or Project Manager.
- F. Subgrade: The undisturbed earth or the compacted soil layer immediately below proposed pavement topping materials.

- G. Structure: Walls, foundations, slabs, pavement or other man-made stationary features occurring above or below ground surface.
- H. Structural Fill: The term “structural fill”, as used herein, includes soil materials used for general site filling under pavements or structures.

1.4 SUBMITTALS

- A. Samples for Verification: For the following products, in sizes indicated below:
 - 1. Warning Tape: Twelve-inches (12”) long; of each color.
- B. Qualification Data: For qualified testing agency.
- C. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
 - 1. Location of soil source.
 - 2. Classification according to ASTM D 2487.
 - 3. Laboratory compaction curve according to ASTM D 698.
- D. For imported backfill materials, general or structural, the Contractor shall provide, at a minimum, a soils report indicating gradation tests, liquid limit, plasticity index and standard proctor density test and free of environmental contaminants. Depending on the use of the imported backfill materials the Project Manager may request that a soils analysis be performed to determine percent organic content of the soils, salt levels, and environmental contaminants of concern. Division 32 Section “Topsoil” for additional information.
- E. Pre-excavation Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.

1.5 PROJECT CONDITIONS

- A. Protection and Repair of Underground lines:
 - 1. Existing Public Utilities: Locate existing underground utilities within the limits of work per General Contract Conditions, Article 804 Protection of Municipal, Public Service or Public Utility Systems. Request utility locates seventy two (72) hours in advance of any excavations by calling the Utility Notification Center of Colorado at 811. The Contractor is responsible for providing written and graphical documentation from the utility owner. Take whatever precautions are necessary including potholing to verify location and depth to protect these underground lines from damage. Should unmarked or incorrectly marked utilities or other piping be encountered during excavation, notify the Project Manager immediately for direction. If damage does occur, all damage shall be repaired by the utility owner and all costs of such repair shall be paid by the Contractor. Only written all clears will be acceptable, verbal all clears will not be accepted.
 - 2. Existing Private Utilities: Locate existing underground utilities within the limits of work per General Contract Conditions, Article 804 Protection of Municipal, Public Service or Public Utility Systems. The Contractor is required to contact all private utility companies including Denver City departments to locate all private utilities. The Contractor is responsible for providing written and graphical documentation from the private utility owner. The request for locates shall be a minimum of seventy two (72) hours prior to

proceeding with any excavation. If, after such requests, private utilities are encountered and damaged by the Contractor these shall be repaired at no cost to the city. If the Contractor damages staked or located private utilities they shall be repaired by the utility owner and all costs of such repair shall be paid by the Contractor. Only written all clears will be acceptable, verbal all clears will not be accepted.

- B. Use of Explosives: Use of explosives is not permitted.
- C. Protection of Persons and Property: The Contractor is responsible for installing barricades and posting with warning lights all open excavations occurring as part of this work.
 - 1. Protect structures, utilities, walkways, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- D. Environmental Requirements: Blasting is not permitted. Employ jack hammering and other loud noises and methods sparingly; comply with all applicable noise abatement ordinances or regulations. Onsite burning is not allowed.
- E. Existing Benchmarks: Carefully preserve and maintain existing benchmarks, vertical/horizontal control, monuments, property line pipes and pins, and other reference points. If disturbed or destroyed, restore or replace at no additional cost to the City.
- F. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in Division 01 Section "Tree Retention and Protection" are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: All fill material, regardless of intended use category, must be clean and free from organic matter, roots, brush or other vegetation, trash, debris or other detrimental substances, and rocks or unbroken lumps larger than three-inches (3"). Project Manager to approve material prior to placement.
- B. Structural Fill: Existing soils obtained from on-site excavations, including granular or aggregate base course from removed pavements shall be free of organic matter or any other deleterious substances, including overly wet soils, bedrock, or high swell content soils. If sufficient materials meeting the above requirements are not available from on-site sources, provide additional material obtained from off-site sources and approved by the testing and inspections agency, at no additional cost to the City. The soil must be compactable and pass, at minimum, a proof roll prior to being accepted for supporting paving materials.
- C. On-Site Topsoil: The top four-inches (4") minimum of organic material in the excavation zone shall be stripped stockpiled prior to other earthwork operations. All stockpiled topsoil shall be reused on site.

2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, six-inches (6") wide and four (4) mils thick, continuously inscribed with a description of the utility; colored as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.
- B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of six-inches (6") wide and four (4) mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to thirty-inches (30") deep; colored as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where the Work of this Section will be performed for compliance with requirements and conditions affecting installation and performance.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within the work area.
 - 2. Verify that final grades are completed in accordance with the drawings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected and approved by Project Manager.

3.2 GENERAL PROCEDURES

- A. Comply with Division 01 Sections and all local, state and national erosion control requirements.
- B. Erosion Control shall be maintained during all phases of site excavation and site development and maintained throughout the construction period in order to protect adjacent properties, streets, and storm sewers from erosion and sediment runoff during the construction process. Do not commence excavation and grading work until erosion control measures are in place and have been inspected and approved by the Wastewater Management Inspector. Contractor shall be responsible for maintaining erosion control measures throughout construction. Frequent monitoring, cleaning and other work required for proper operation shall be Contractor's

responsibility. Contractor shall modify/replace all erosion control measures to fit field conditions following direction for corrective actions from Project Manager and or Wastewater Management Inspector.

3.3 QUALITY CONTROL

- A. Coordinated and paid for by Contractor.
- B. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.
- C. Comply with requirements within project Geotechnical Report.
- D. Codes and Standards: Comply with all applicable local, state and Federal rules, regulations and ordinances concerning sloping of excavation, trenching and safety of workers, including the latest version of OSHA requirement.
- E. Testing Agency: All testing required to determine compliance for the work of this section will be completed as specified in Division 01 Section "Contractor Quality Control". Testing Agency to test the following, and as stated throughout this Section:
 - 1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
 - 2. Determine that fill material and maximum lift thickness comply with requirements.
 - 3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.
- F. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- G. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every two thousand (2,000) sq. ft. or less of paved area or building slab, but in no case fewer than three (3) tests.
 - 2. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every one hundred fifty feet (150') or less of trench length, but no fewer than two tests.
 - 3. Landscaped areas: At least one test every twenty thousand (20,000) sq. ft or less of disturbed landscaped area, but in no case fewer than two tests.
- H. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; re-compact and retest until specified compaction is obtained.
- I. Submit testing report documentation to Project Manager per Division 01 Section "Quality Assurance".

3.4 DEWATERING

- A. Wherever possible, prevent surface water and subsurface or groundwater from flowing into excavations and from flooding the project site and surrounding area.
- B. Contractor shall be required to dewater excavated areas by pumping, or otherwise control the water so that the project can be constructed in accordance with the plans. Any controlling of the water must be performed in such a manner that recently constructed portions of the project are not damaged. Repairs shall be at the Contractor's expense.
- C. Damage to adjacent property that results from the Contractor's alteration of any surface drainage, ground water flows or pumped water shall be repaired by the Contractor at no additional cost to the City.

3.5 GROUND SURFACE PREPARATION

- A. Complete clearing and grubbing operations in accordance with Division 31 Section "Clearing and Grubbing". Where new material is to be placed on compacted subgrade, scarify ground surface until surface is free from ruts, hummocks or other uneven features, which would prevent uniform compaction and bond between old and new material.
- B. Prior to placing any new sections of asphalt or concrete pavement, the entire subgrade shall be scarified to a depth of six-inches (6"). In areas where existing pavement is to be removed and replaced the existing compacted subgrade may be reused if the subgrade meets specified compaction. In areas of existing subgrade that do not meet the specified compaction, materials shall be removed, replaced and compacted to meet the specified proctor density. Adjust moisture content and compact as hereinafter specified.

3.6 STRIPPING AND STOCKPILING TOPSOIL

- A. Strip all topsoil from the excavation zone for new facilities (four-inches (4") in depth for all disturbed areas). Stockpile topsoil in locations as directed by the Project Manager.
- B. Placing topsoil, refer to Division 32 Section "Topsoil".

3.7 EXCAVATION

- A. Stability of excavations: Comply with local codes, ordinances, and requirements of agencies having jurisdiction to include the latest revision to OSHA standards.
- B. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as indicated within a tolerance of +/- one tenth foot (0.1').
- C. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. Six-inches (6") outside of minimum required dimensions of concrete cast against grade.
 - b. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - c. Six-inches (6") beneath bottom of concrete slabs-on-grade.
- D. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Project Manager and approved by Project Manager. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.
 1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
 - a. Intermittent drilling; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
 2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. Twenty four-inches (24") outside of concrete forms other than at footings.
 - b. Twelve-inches (12") outside of concrete forms at footings.
 - c. Six-inches (6") outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. Six-inches (6") beneath bottom of concrete slabs-on-grade.
 - f. Six-inches (6") beneath pipe in trenches, and the greater of twenty four-inches (24") wider than pipe or forty two-inches (42") wide.

3.8 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 0.1 foot.
- B. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.
 1. Prior to placing the pavement section, the entire subgrade should be scarified to a depth of six-inches (6"), adjusted to a moisture content near optimum and compacted.

3.9 SUBGRADE INSPECTION

- A. Notify Project Manager when excavations have reached required subgrade.
- B. If Project Manager determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

- C. Proof-roll subgrade in locations identified by the Project Manager with a pneumatic-tired and loaded ten (10-wheel), tandem-axle dump truck weighing not less than fifteen (15) tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction. Limit vehicle speed to three (3) mph.
 - 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Project Manager, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Project Manager, without additional compensation.

3.10 SPECIAL CONDITIONS

- A. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than thirty five degrees (35°) F.
- B. Dust Control: Provide dust control to alleviate dust nuisance to the public, to adjacent properties and other work underway at the project site.
- C. Unanticipated Conditions: Notify the Project Manager immediately upon finding subsurface or other conditions which are not shown or which cannot be reasonably assumed from existing surveys. Secure Project Manager's instructions before proceeding with further work in such areas.
- D. Unsatisfactory Soils: Remove or otherwise correct unsanitary, sour, or otherwise unsatisfactory soil. Remove contaminated or unsuitable material from under paved areas.
- E. Additional Excavation: When excavation has reached required subgrade elevations, the Contractor shall contact the testing agency, which will make an observation of conditions. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by the testing agency.

3.11 FILL AND BACKFILL

- A. General: Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in this Section.
 - 1. Under grassed areas, use satisfactory, excavated or borrow material.
 - 2. Under walks and pavements, use satisfactory, excavated or borrow materials, or a combination to meet structural fill requirements.
- B. Backfill excavations as promptly as work permits, but not until completion of the following:
 - 1. Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded.
 - 2. Removal of all trash and debris from excavation.

3.12 PLACEMENT AND COMPACTION

- A. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Ground

surfaces that are steeper than four-to-one (4:1) (horizontal to vertical) shall be stripped of vegetation, scarified to a depth of six-inches (6") and create excavated benches to ensure that fill material will bond with the existing surface.

1. Present remediation options to Project Manager for any soils that do not meet the specified standard proctor density to bring those soils into compliance with the specifications.
- B. Place backfill and fill materials in layers not more than eight-inches (8") in loose depth for material compacted by heavy compaction equipment, and not more than four-inches (4") in loose depth for material compacted by hand-operated tampers, each layer to be compacted to meet requirements herein.
- C. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- D. Compaction of Fill for Hardscape Areas:
1. Select fill material shall be placed and mixed in evenly spread layers. After each fill layer has been placed, it shall be uniformly compacted. Fill materials shall be placed such that the thickness of loose material does not exceed eight-inches (8") and the compacted lift thickness does not exceed six-inches (6").
 2. Compaction shall be obtained by the use of sheepfoot rollers, multiple-wheel pneumatic-tired rollers, or other equipment required to meet specifications. Granular fill shall be compacted using vibratory equipment or other equipment required to meet specifications. Compaction of each layer shall be continuous over the entire area. Compaction equipment shall make sufficient passes to ensure that the required density is obtained. Refer to Paragraph 3.12.I herein for criteria.
 3. Prior to placement of any base or surfacing materials, one hundred percent (100%) of the subgrade shall be proof rolled with a fully loaded tandem-axle truck.
- E. Control soil and fill compaction, providing minimum percentage of density specified. Correct improperly compacted areas or lifts as directed if soil density tests indicate inadequate compaction.
- F. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.
1. Moisture Content: The Contractor may be required to add moisture to the excavation materials in the stockpile area if it is not possible to obtain uniform moisture content by adding water on the fill surface. The Contractor may be required to rip or disc the fill soils to provide uniform moisture content through the soils.
 2. The application of water to the embankment materials shall be made with any type of watering equipment which will give the desired results. Water jets from the spreader shall not be directed at the embankment with such force that fill materials are washed out.
 3. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

4. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by disking, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

- G. Density Tests: Field density tests shall be made by the Contractor per Division 01 Section "Contractor Quality Control" locations and depths selected by the Project Manager. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several-inches. Density tests shall be taken in compacted material below the disturbed surface. When density tests indicate that the density or moisture content of any layer of fill or portion thereof is below that required, the particular layer or portion shall be reworked until the required density or moisture content has been achieved. Criteria for acceptance are as follows:
1. Under pavements and structures: Intervals and quantities of tests required shall be established by the Project Manager. On-site or imported clay materials shall be compacted to at least ninety five percent (95%) of maximum standard Proctor dry density (ASTM D 698) at moisture content within two percent (2%) of optimum. Granular material, whether imported or developed on-site, shall be moisture conditioned to within two percent (2%) of optimum and compacted to at least 95% of maximum modified Proctor dry density (ASTM D 1557).
 2. Under landscape areas (top 12-inches): Eighty five percent (85%) of maximum standard Proctor dry density at moisture content within two percent (2%) of optimum (ASTM D 698).

3.13 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
1. Stockpile soil materials away from edge of excavations. Do not store within drip line of existing trees or within Tree Protection Fencing. Refer to Division 01 Section "Tree Retention and Protection".

3.14 GRADING

- A. General: Uniformly grade areas within project limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations or contours are indicated or between such points and existing grades.
- B. Subgrade tolerances are as follows:
1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than one tenth foot (0.10') above or below required subgrade elevations.
 2. Pavements: Shape surface of areas under pavement to line, grade, and cross-section, with finish surface not more than two one-hundredths foot (0.02') above or below required subgrade elevation.
- C. Under no circumstances shall variations from specified grade elevations create any ponding or retention of water on intermediate pavement levels, or finished surfaces.

3.15 PLACING STOCKPILED TOPSOIL

- A. Refer to Division 32 Section "Topsoil".

3.16 FIELD QUALITY CONTROL

- A. Special Inspections: Project Manager may engage a qualified special inspector to perform the inspections in addition to the Contractors requirements for testing for the purposes of verifying results of Contractor's Testing Agency.

3.17 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Project Manager; reshape and re-compact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work.

3.18 MAINTENANCE

- A. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.
- B. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.19 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Removal from City's Property: Remove waste materials, including materials not allowed for fill, backfill or site grading as specified within, trash, contaminated materials, and debris, and legally dispose of it off City's property at Contractor's expense. All recyclable materials shall be hauled to nearest recycling center and any non-recyclable materials shall be hauled to Denver Arapahoe Disposal Site (DADS). DADS Disposal tickets shall be provided to the Contractor by Project Manager.
- B. Remove any excess fill material from the site, unless otherwise directed by the Project Manager.
- C. Remove any materials determined to be hazardous or contaminated to DADS. DADS Disposal tickets or hazardous waste manifest tickets shall be provided to the Contractor by Project Manager.
- D. Removal of unsuitable material and its replacement as directed will be paid on basis of Conditions of the Contract relative to changes in work.

EXHIBIT K

Sullivan Gateway
Mundus Bishop

Earth Moving
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END OF SECTION 31 20 00

SECTION 32 11 16**AGGREGATE BASE COURSE****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes the requirements for furnishing and placing crushed aggregate, bonded with fine aggregate, constructed on a prepared underlying course in accordance with these specifications and in conformity with the dimensions, typical cross section, and the lines and grades shown on the Contract Drawings. The locations where aggregate base course will be used are shown on the Contract Drawings.
- B. Related Sections:
 - 1. Division 01 Section "Layout of Work and Surveys".
 - 2. Division 01 Section "Contractor Quality Control".
 - 3. Division 01 Section "Erosion and Sedimentation Control".
 - 4. Division 31 Section "Earth Moving".
 - 5. Division 32 Section "Concrete Walks, Curbs, and Miscellaneous Flatwork".

1.3 SUBMITTALS

- A. See Division 01 Section "Submittals" for submittal requirements.
- B. Certification: Contractor shall provide a certificate of compliance for any imported Aggregate Base Course materials.
- C. Gradation and Standard Proctor Density Test Results: For imported backfill materials, at a minimum, submit results of gradation tests and standard proctor density test.

PART 2 - PRODUCTS**2.1 AGGREGATE BASE COURSE**

- A. Aggregate base course shall meet the requirements of Item 703.03 of the Standard Specifications for Road and Bridge Construction of the Colorado Department of Highways, latest revision for Class five (5) or Class (6), or as specified by the Soils Engineer and on Contract Drawings.

2.2 RECYCLED CONCRETE

- A. May be substituted for five (5) or Class (6) Aggregate, if acceptable to the Project Manager.

2.3 AGGREGATE

- A. The use of this term implies the use of Aggregate Base Course within this Section only.

PART 3 - EXECUTION

3.1 EQUIPMENT

- A. All equipment necessary for the proper construction of this work shall be in working condition, and shall be free of fluid leaks. Project Manager reserves the right to have any piece of equipment removed from the site if it is deemed inoperable and/or is leaking fluids.

3.2 PREPARING SUBGRADE

- A. The underlying subgrade or base course shall be tested at the Contractors expense and accepted by the Project Manager before placing and spreading operations are started. See Division 01 Section "Contractor Quality Control".

3.3 METHOD OF SPREADING

- A. The aggregate material shall be placed on the prepared underlying course and compacted in layers not to exceed six-inches (8") in depth before compaction. The depositing and spreading of material shall commence where designated and shall progress continuously without breaks. The material shall be deposited and spread in a uniform layer and without segregation of size to a uniform thickness.
- B. The aggregate spread shall be of uniform grading with no pockets of fine or course materials. During the spreading process, sufficient caution shall be exercised to prevent the incorporation of underlying materials in the aggregate.

3.4 COMPACTION OF AGGREGATE BASE COURSE

- A. When aggregate base course is used as part of asphalt roadway system (asphalt and base course composite section), the aggregate base course shall be compacted to 95% of Modified Proctor per ASTM D-1557, within 2% of optimum moisture.
- B. Aggregate material shall be placed and mixed in evenly spread layers. After each fill layer has been placed, it shall be uniformly compacted. Fill materials shall be placed such that the thickness of loose material does not exceed eight-inches (8") and the compacted lift thickness does not exceed six-inches (6").
- C. Compaction shall be obtained by the use of vibratory rollers, multiple-wheel pneumatic-tired rollers, or other equipment approved by the Project Manager. Granular fill shall be compacted using vibratory equipment or other equipment approved by the Project Manager. Compaction of each layer shall be continuous over the entire area. Compaction equipment shall make sufficient passes to ensure that the required density is obtained.
- D. Prior to placement of any base or surfacing materials, one-hundred percent (100%) of the subgrade shall be proof rolled with a fully loaded tandem-axle truck.

EXHIBIT K

Sullivan Gateway
Mundus Bishop

Aggregate Base Course
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3.5 PROTECTION

- A. Spreading of aggregate shall not take place when temperatures are below freezing. When the aggregate base course contains frozen material or the underlying subgrade is frozen, construction shall not occur.

3.6 MAINTENANCE

- A. Following the completion of the base course, the Contractor shall perform all maintenance work necessary to keep the aggregate in a satisfactory condition until acceptance of the project. The surface shall be kept clean and free from foreign material. The base course shall be properly drained at all times. Any work, maintenance or necessary repairs shall be performed at the expense of the Contractor.

END OF SECTION 32 11 16

EXHIBIT K

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SECTION 32 13 13

CONCRETE WALKS, CURBS, AND MISCELLANEOUS FLATWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes requirements for furnishing, placing, shoring, bracing, and anchorage of formwork, concrete reinforcement, accessories, and placing concrete flatwork, including walks, curbs and gutters, ramps, and pans, including installation of control and expansion joints, concrete curing and concrete finishing.
- B. Related Sections:
 - 1. Division 01 Section "Layout of Work and Surveys".
 - 2. Division 01 Section "Submittals".
 - 3. Division 01 Section "Contractor Quality Control".
 - 4. Division 01 Section "Erosion and Sedimentation Control".
 - 5. Division 31 Section "Earth Moving".
 - 6. Division 32 Section "Aggregate Base Course".

1.3 REFERENCES

- A. Note: All references below shall be from the most current edition.
- B. American Concrete Institute (ACI):
 - 1. ACI 117 - Standard Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 - Specifications of Structural Concrete for Buildings.
 - 3. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
 - 4. ACI 305 and 306 - Hot and Cold Weather Protection for Concrete.
 - 5. ACI 315 - Details and Detailing of Concrete Reinforcement.
 - 6. ACI 318 - Building Code Requirements for Reinforced Concrete.
 - 7. ACI 347 - Recommended Practice for Concrete Formwork.
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.
 - 2. ASTM C33 - Concrete Aggregates.
 - 3. ASTM C94 - Ready-Mixed Concrete.
 - 4. ASTM C150 - Portland Cement.
 - 5. ASTM C260 - Air Entraining Admixtures for Concrete.
 - 6. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
 - 7. ASTM C494 - Water Reducing Admixtures for Concrete.

8. ASTM C618 - Fly Ash Mineral Admixture for Concrete.
9. ASTM C672 - Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals.
10. ASTM-C800 - Curing Compound, Concrete, for New and Existing Surfaces.

D. CRSI - Manual of Standard Practice.

E. Colorado Department of Transportation (CDOT) – Standard Specifications for Road and Bridge Construction, latest edition

F. National Ready Mixed Concrete Association

1.4 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

B. Definitions: Refer to ACI 301 11.7 for definition of slab surface finishes.

1.5 SUBMITTALS

A. See Division 01 Section “Submittals” for submittal requirements.

B. Product Data: For each type of product indicated.

C. Material Certificates: For the following, from manufacturer:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Fiber reinforcement.
4. Admixtures.
5. Curing compounds.
6. Applied finish materials.
7. Bonding agent or epoxy adhesive.
8. Joint fillers.

D. Field quality control reports.

E. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.

F. Mix Designs:

1. Submit substantiating data for each concrete mix design specified for use to the Project Manager not less than four (4) weeks prior to first concrete placement. Data for each mix shall, as a minimum, include the following per section 2.7.B:
 - a. Mix identification designation (unique for each mix submitted).
 - b. Statement of intended use for mix.
 - c. Mix proportions.
 - d. Aggregates.
 - e. Admixtures (must be approved by the Project Manager)
 - f. Wet and dry unit weight.
 - g. Entrained air content.
 - h. Design slump.

- i. Strength qualification data.

1.6 QUALITY CONTROL

- A. Detectable Warning Installer Qualifications: An employer of workers trained and approved by manufacturer of stamped concrete paving systems.
- B. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
- C. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- D. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.
- E. ACI Publications: Comply with ACI 301 unless otherwise indicated.
- F. Pre-installation Conference: Conduct conference at Project site.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete Subcontractor.
 - e. Special concrete finish Subcontractor.
 - 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, concrete repair procedures, and concrete protection.
- G. Sample Panel(s): If requested by the Project Manager, prior to starting any concrete paving, provide a sample panel using materials indicated for project work. For each type, color and finish of concrete specified, build panel at the site of full thickness and approximately ten feet (10') by 10 feet (10'), including expansion joints, control joint, scales, fillers, and one radial edge. Provide the workmanship proposed for the work. Correct and replace sample panel until Project Manager's acceptance of the work. Retain panel(s) during construction as a standard for completed paving work.

1. The approved sample panel may be a portion of the work and remain in place. Locations as directed by the Project Manager.
- H. Record of Work: A record shall be kept by the Contractor listing the time and date of placement of all concrete for paving. Such record shall be kept until the completion of the project and shall be available to the Project Manager for examination at any time.
- I. All testing shall be completed by the Contractor at their expense unless otherwise specified by the contract.
1. Testing Frequency: Obtain at least one composite sample for each one hundred (100) cu. yd. or five thousand (5,000) sq. ft. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five (5) compressive-strength tests for each concrete mixture, testing shall be conducted from at least five (5) randomly selected batches or from each batch if fewer than five (5) are used.
 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four (4) standard cylinder specimens for each composite sample.
 5. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at twenty eight (28) days, and keep one for backup in the event a sample should break.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at twenty eight (28) days.
- J. Strength of each concrete mixture will be satisfactory if average of any three (3) consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than two-hundred (200) psi.
- K. Test results shall be reported in writing to Project Manager, concrete manufacturer, and Contractor within forty eight (48) hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at twenty eight (28) days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both seven (7) and twenty eight (28) day tests.
- L. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Project Manager.
- M. Concrete paving will be considered defective if it does not pass tests and inspections.

- N. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- O. Prepare test and inspection reports.

1.7 DELIVERY, STORAGE AND HANDLING

- A. General: Materials handling and batching shall conform to applicable provisions of ASTM C94.
- B. Reinforcing: Unload and store reinforcing bars so they are kept free of mud and damage.
- C. Hauling Time for Concrete: Deliver and discharge all concrete transmitted in a truck mixer, agitator, or other transportation device not later than one and one-half (1-1/2) hours, or three hundred (300) revolutions of the drum after the mixing water has been added, whichever is earliest.
- D. Extra Water:
 - 1. Deliver concrete to site in exact quantities required by design mix.
 - 2. Should extra water be required for workability before depositing concrete, and the water/cement ratio of accepted mix design will not be exceeded, the General Contractor's superintendent shall have the sole authority to authorize addition of water. Additional water shall not exceed one (1) gallon/cu. yd. Any additional water added to mix after leaving batch plant shall be indicated on truck ticket and signed by person responsible.
 - 3. Where extra water is added to concrete it shall be mixed thoroughly for thirty (30) revolutions of drum before depositing.
 - 4. Water may be added at the site only once for each batch.
 - 5. A full set of tests shall be performed after addition of water. Excessive slump or other out of range tests will be cause for rejection.

1.8 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Cold Weather Placement:
 - a. When for three successive days prior to concrete placement the average daily outdoor temperature drops below forty degrees (40°) F or when the average outdoor temperature is expected to drop below forty degrees (40°) F on the day of concrete placement, preparation, protection and curing of concrete shall comply with ACI 306R. Concrete temperature shall maintained above fifty degrees (50°) F using concrete blankets or heating.
 - b. Minimum temperature of concrete upon delivery shall conform to ACI 301 Table 7.6.1.1. Concrete at time of placement shall conform to minimum values of ACI 306R Table 1.4.1, and shall not be below minimum temperature of fifty degrees (50°) F.
 - c. Subject to acceptance of the Project Manager an accelerating admixture may be used. Admixtures shall meet requirements of Part 2. Calcium Chloride and other chloride-type accelerating admixtures are not allowed.

- d. Comply with concrete protection temperature requirements of ACI 306R. Record concrete temperatures during specified protection period at intervals not to exceed sixteen (16) hours and no less than twice during any twenty four (24) hour period.
 - 2. Hot Weather Placement:
 - a. When depositing concrete in hot weather, follow recommendations of ACI 305R.
 - b. Temperature of concrete at time of placement shall not exceed eighty five (85°) F.
 - c. When air temperatures on day of placement are expected to exceed ninety degrees (90°) F, mix ingredients shall be cooled before mixing. Flake ice or well-crushed ice of a size that will melt completely during mixing may be substituted for all or part of mix water.
 - d. Retarding admixture may be used subject to acceptance of the Project Manager. Admixtures shall meet requirements of Part 2.
 - e. Protect to prevent rapid drying. Start finishing and curing as soon as possible.
 - B. Protection: Protect newly finished slabs from vandalism and all weather related damage. Protect finished slabs from mortar leakage from pouring of concrete above. Cover masonry walls, glazing, and other finish materials with polyethylene or otherwise protect from damage due to pouring of concrete.
 - C. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- 1.9 RIGHT OF WAY WORK
- A. Contractor shall obtain all necessary permits when working with in the Right of Way.
 - B. Contractor shall preserve and protect all permanent land survey control markers. Per the General Contract Conditions Article 319 "Preservation of Permanent land Survey Control Markers".

PART 2 - PRODUCTS

2.1 SUBGRADE MATERIAL

- B. Dense, readily compactible material, free from organic matter, clay, and loose rock in excess of one and one half-inches (1-1/2"). Material excavated from on-site that meets this requirement may be used if approved by Project Manager.

2.2 FORM MATERIALS

- A. Hand Placed Steel Forms: Hand placed steel forms are only to be used for sections that are straight and have no bend, radii or curvature in the sections to be used.
- B. Plywood Forms: Are to be used on any section of concrete that have bends, radii or curvature. Forms shall be made of Douglas Fir or Spruce species; solid one side grade; sound, undamaged sheets with straight edges. Staking shall be adequate to hold wet concrete while maintaining the desired radii.

- C. Lumber: Douglas Fir or Spruce species; construction grade; with grade stamp clearly visible.
- D. Form Coatings: Provide commercial formulation form coating compounds that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.3 CONCRETE MATERIALS

- A. Provide materials in accordance with ACI 301, unless amended or superseded by requirements of this section or general notes on structural drawings.
 - 1. General: Ready-mixed Concrete: ASTM C94. On-site mixed concrete not allowed.
 - 2. Cement: ASTM C150. Type II minimum of five hundred sixty four (564) pounds per cubic yard.
 - 3. Fly Ash: ASTM C618 Class C or F. Fly ash shall not exceed fifteen percent (15%) of total cementitious material by weight.
 - 4. Aggregate: ASTM C33. Obtain from same source throughout project.
 - a. Fine Aggregate: Natural sand.
 - b. Coarse Aggregate: Gravel or crushed stone containing no deleterious substances which cause surface spalling.
 - 5. Water: ASTM C 94/C 94M, Clean and not detrimental to concrete.

2.4 STEEL REINFORCEMENT

- A. Recycled Content: Provide steel reinforcement with an average recycled content of steel so postconsumer recycled content plus one-half of preconsumer recycled content is not less than twenty five percent (25%).
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- C. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M; with ASTM A 615/A 615M, Grade 60 (Grade 420) deformed bars.
- D. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) plain-steel bars. Cut bars true to length with ends square and free of burrs.
- E. Epoxy-Coated, Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars.
- F. Tie Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- G. Hook Bolts: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- H. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, and dowels in place. Manufacture bar supports according to CRSI's "Manual

of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

- I. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating, compatible with epoxy coating on reinforcement.

2.5 SLIP "SPEED" DOWELS

A. Slip Joints:

1. Speed Dowel Model PSD09/#4TX, 9" long sleeve to accommodate 18" smooth steel round bar. Manufactured by Sika/Greenstreak, (800)325-9504, or equal.
2. Dowel, 18" long smooth round steel bar, 5/8" diameter. De-bur cut ends.

2.6 ADMIXTURES

- A. General: Unless specified, no admixtures may be used without specific approval of the Project Manager.
- B. Prohibited Products: Calcium chloride or admixtures containing more than 0.05% chloride ions or thiocyanates are not permitted.
- C. Air-Entraining Admixture: ASTM C260. Subject to compliance with requirements, provide one of the following:
 1. "Air Mix" by Euclid Chemical Co.
 2. "Darex ARA" by W. R. Grace.
 3. "Micro-Air" by Master Builders.
 4. Or equal.
- D. Water Reducing Admixture: ASTM C494, Type A. Subject to compliance with requirements, provide one of the following:
 1. "Eucon WR-75" by Euclid Chemical Co.
 2. "Rheobuild 1000" by Master Builders.
 3. "Plastocrete 106" by Sika Chemical Co.
 4. Or equal.
- E. High Range Water Reducing Admixture (Superplasticizer): ASTM C494, Type F or G. Subject to compliance with requirements, provide one of the following:
 1. "Eucon 37" by Euclid Chemical Co.
 2. "Pozzolith 400N" by Master Builders.
 3. "Sikament" by Sika Chemical Co.
 4. Or equal.
- F. Warm weather admixtures: ASTM C494. Use of admixtures will not relax warm weather placement requirements.

- G. Cold Weather Admixtures: ASTM C494. Use of admixtures will not relax cold weather placement requirements.

2.7 CONCRETE MIX

- A. Refer to the Denver Right of Way Services approved materials list of pre-approved concrete mixes at the following website:

<http://denvergov.org/rightofwayservices/RightofWayServices/ConstructionInspection/RightofWayConstructionInspection/ApprovedMaterials/tabid/442460/Default.aspx>

- B. All Concrete mixes from the approved list or submitted for approval shall meet the following criteria.

1. All concrete for flatwork shall be Class P (four thousand two hundred (4,200) PSI) unless otherwise requested by the Project Manager.
2. Mix concrete in accordance with ASTM C94 and ACI 301 Chapter 3.
3. Cement Content: Type II cement, minimum of five hundred sixty four pounds (564#) per cubic yard.
4. Maximum water-cement ratio: 0.44.
5. Slump: 4-inches maximum when hand placed.
6. Air Entrainment: five percent (5%) to eight percent (8%).
7. Aggregate Size: three quarter-inch (3/4") maximum.
8. Deliver concrete and discharge all concrete transmitted in a truck mixer, agitator, or other transportation device not later than one and one-half (1-1/2) hours, or three hundred (300) revolutions of the drum after the mixing water has been added, whichever is earliest.
9. During cold weather (below forty five degrees (45°) F), use heated water and aggregates if necessary to maintain concrete temperature between sixty degrees (60°) F. and ninety degrees (90°) F.
10. Concrete for Footings, Walls, and Interior Slabs-on-Grade shall be Class B, as approved by the Project Manager.
11. Concrete for Exterior Flatwork, including Pavement, Curb and Gutter, and Drainage Pans shall be Class P, as approved by the Project Manager.
12. Fly Ash: Per CDOT Standard Specifications for Road and Bridge Construction Section 701.02.

2.8 EXPANSION JOINT MATERIAL

- A. Interior Use or Exterior Use where sealants are specified: Bituminous saturated fiber conforming to ASTM D1751, one half-inch (1/2") thick. Provide manufacturer's certification of compatibility with specified sealants where required.
- B. Pre-molded closed cell polyethylene foam: Backer rod if required, equal to "Sonoflex F" by BASF, Provide half-inch (1/2") thick by depth of the slab material, allow half-inch (1/2") thickness for joint sealer.
- C. Joint Sealant: Sonolastic Sealant as manufactured by BASF or a silicone material that is on CDOT's approved silicone sealant list. Where color additive is used, color to match.

2.9 CONTROL JOINTS

- A. Shall be in conformance with current Denver Department of Public Works Traffic Engineering Standards and Details and as shown on Contract Drawings

<http://www.denvergov.org/Portals/487/documents/CCD%202010%20Trans%20Standards%20and%20Details%20-%20Complete.pdf>

2.10 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately nine (9) oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
1. Products: Subject to compliance with requirements provide the following:
- a. BASF Construction Chemicals, LLC; Confilm.
 - b. Or approved equal.
- E. White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type two (2), Class B, dissipating.
1. Products: Subject to compliance with requirements, provide the following:
- a. Dayton Superior Corporation; Day-Chem White Pigmented Cure (J-10-W).
 - b. Or approved equal.

2.11 RELATED MATERIALS

- A. Chemical Surface Retarder: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of one eighth-inch (1/8") to one quarter-inch (1/4") to match Project Manager's sample.
1. Products: Subject to compliance with requirements,
- a. Conspec by Dayton Superior; Delay S.
 - b. Or approved equal.

2.12 TRUNCATED DOME INSERTS FOR RAMPS

- A. Shall be in conformance with current Denver Department of Public Works standards.

PART 3 - EXECUTION

3.1 PREPARATION OF SUBGRADE

- A. Excavate to required depth in accordance with geotechnical report. Remove soft, yielding material and replace with select fill. Compact to minimum ninety five percent (95%) Standard Proctor within two percent (2%) of optimum moisture.

3.2 MAINTENANCE OF SUBGRADE

- A. Maintain subgrade in a compacted condition until concrete is placed.

3.3 FORMS

- A. Metal or uniform warp free lumber, coated with form release agent. Slope forms to give slabs positive drainage and stake securely. Obtain approval of Project Manager for alignment and grade of forms a minimum of forty eight (48) hours prior to placing concrete. Any concrete work installed without obtaining approval from the Project Manager shall be subject to removal and replacement at the discretion of the Project Manager, at no cost to the City.
- B. Radii shall be continuous and flowing to avoid angular intersections in the horizontal alignment, radial forming shall use bender board or approved equal as directed by Project Manager.

3.4 STEEL REINFORCEMENT

- A. Install steel reinforcement only in locations shown on Contract Drawings.
- B. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- C. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- D. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

3.5 CONCRETE PLACEMENT

- A. Prior to placing any new sections of asphalt or concrete pavement, the entire subgrade shall be scarified to a depth of 6-inches. In areas where existing pavement is to be removed and replaced the existing compacted subgrade may be reused if the subgrade meets specified compaction. In areas of existing subgrade that do not meet the specified compaction, materials shall be removed, replaced and compacted to meet the specified proctor density. Adjust moisture content and compact as hereinafter specified.
- B. Before placing concrete, inspect and complete formwork installation, steel reinforcement (if present), and items to be embedded or cast-in.
- C. Do not place concrete on frozen surfaces.

- D. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- E. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- F. Do not add water to concrete during delivery.
- G. Deposit and spread concrete in a continuous operation between transverse joints. Do not use vibratory equipment to move concrete into place.
- H. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- I. Screed paving surface with a straightedge and strike off.
- J. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- K. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.
- L. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
 - 1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.
- M. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - 1. When air temperature has fallen to or is expected to fall below forty degrees (40°) F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than fifty degrees (50°) F and not more than eighty degrees (80°) F at point of placement.
 - 2. If subgrade is frozen, as determined by Geotechnical Engineer and/or Project Manager, thaw subgrade to depth of eight (8") prior to placing concrete.
 - 3. Do not use frozen materials or materials containing ice or snow.
 - 4. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- N. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature below ninety degrees (90°) F at time of placement. Chilled mixing water or chopped ice may be used to control

SECTION 32 15 40

STALOK® PAVING MATERIAL

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section consists of all paving work and related items as indicated on the drawings and or as specified herein and includes, but is not limited to, the following items:
 - 1. StaLok® Paving Material aggregate surfacing
- B. Related Sections:
 - 1. Section 02100 – Site Preparation
 - 2. Section 02200 – Earthwork
 - 3. Section 02230 – Granular Materials
- C. General Provisions
 - 1. All of the contract documents, including General and Supplementary Conditions and Division I General Requirements, apply to the work of this Section.
 - 2. Examine all drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.
 - 3. Coordinate work with that of all those affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 PERFORMANCE REQUIREMENTS

- A. The following standards and definitions are applicable to the work of this Section to the extent referenced herein:
 - 1. Standard Specifications: Highway Department, Standard Specifications for Highways and Bridges, latest edition.
 - 2. ASTM: American Society for Testing and Materials.
 - 3. AASHTO: American Association of State Highway and Transportation Officials.

1.3 SAMPLES AND SUBMITTALS

- A. Sieve analysis of aggregate for pathways and patios.

B. Samples and or shop drawings for the following:

1. Aggregate for strength and color.

C. Construction Samples:

1. Construct mock-up panels or areas for each different type of paving system as specified herein to demonstrate ability to archive types of setting bed, joints, pattern, color and texture required herein.
2. StaLok® Paving Material for aggregate pathway and patio surfacing: Construct a 12' x 24' sample of finished area as directed by the Owner's Representative on site.
3. General:
 - a. Schedule mock-up construction so that mock-up can be accepted a minimum of 30 days prior to the application of paving surfaces represented by the mock-up.
 - b. Locate mock-up panel(s) in areas as directed by the Owner's Representative.
 - c. Continue to construct mock-ups until acceptable mock-up is produced (at no cost to the Owner). Acceptable mock-up shall be standard for texture, color and workmanship.
 - d. Use same setting bed and joint mixes used in accepted mock-up in final work unless otherwise directed by Owner's Representative.
 - e. Protect accepted mock-ups from damage until completion and acceptance of the work represented by the mock-ups.
 - f. Remove mock-up panel(s) from the site at completion of the project, unless otherwise instructed by Owner's Representative.

1.4 PROJECT/SITE CONDITIONS

- A. Field Measurements: Each bidder is required to visit the site of the work to verify the existing conditions. No adjustments will be made to the Contract Sum for variations in the existing conditions.
1. Where surfacing is indicated to fit with other construction, verify dimensions of other construction by field measurements before proceeding with the work.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Installer to provide evidence to indicate successful experience in installation of StaLok® Paving Material or approval by manufacturer.

1.6 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

- B. Special Warranty: Submit a written warranty executed by the installer agreeing to repair or replace components of StaLok® Paving Material that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:
1. Premature wear and tear, provided the material is maintained in accordance with manufacturer's written maintenance instructions.
 2. Failure of system to meet performance requirements.
- C. Warranty Period: Contractor shall provide warranty for performance of product. Contractor shall warranty installation of product for the time of one year from completion.
- D. Contractor shall provide, for a period of sixty days, unconditional maintenance and repairs as required.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. StaLok® Paving Material is provided by the following manufacturer:
1. Stabilizer Solutions, Inc. 33 South 28th St., Phoenix, AZ 85034; phone (602) 225-5900, (800) 336-2468; fax (602) 225-5902; website www.stabilizersolutions.com; email info@stabilizersolutions.com

2.2 MATERIALS

- B. Aggregate Specifications
1. Crushed stone shall consist of inert materials that are hard, durable, with stone free from surface coatings and deleterious materials. Gradation requirements shall be as follows:

U.S. Sieve No.	Percent Passing by Weight
# 1/2-inch	98 – 100
# 3/8-inch	90 – 100
# 4	65 – 80
# 8	48 – 63
# 16	40 – 49
# 30	30 – 40
# 50	20 – 27
# 100	10 – 18
# 200	10 – 12

2. R-value minimum of 70 determined by ASTM D 2488 Methodology (R-value is a measure of wear resistance).
3. Sand equivalent – an engineering measurement of the proportion of sand to silt and clay, will stay at a range of 30-55. As determined by ASTM D 2419 methodology.
4. Dense graded crushed stone base shall be furnished and installed as required and specified under Section 02200, Earthwork and Section 02230 Granular Materials to a 6" compacted depth.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Base shall be 3" thick layer of your state's DOT crushed granular base material installed at 95% compaction on top of subgrade.
- B. Make any corrections necessary to base furnished and installed under Section 02200 Earthwork and Section 02230 Granular Materials to bring gravel to the sections and elevations shown on the drawings.
- C. Pre-soak base material with water prior to installing StaLok® Paving Material as needed to compact base.
- D. Make sure proper drainage is available to ensure no standing water on surface or adjacent to StaLok® Paving Material.

3.2 BLENDING

- A. StaLok® Paving Material is a solely owned patented process.
- B. Blending procedures are performed only by a licensed StaLok® Paving Material blender and can only be sold through licensed StaLok® Paving Material Dealers. It is a pre-blended, bulk material.

3.3 PLACEMENT/COMPACTION

- A. Consult manufacturer if installing on slope.
- B. Do not install in rainy conditions.
- C. Avoid installing StaLok® Paving Material below 30°F. StaLok® Paving Material may form clods during transport below 60°F. Large clods may be broken apart with machinery such as front loader, or on their own if left to warm in sun. Small clods will break apart during placement and compaction.
- D. Place StaLok® Paving Material at a minimum 2", maximum 3" compacted depth.

Using a Paver Box, Paver, Crawler Paver, Asphalt Paver, Drag Box Paver, Pavement Profiler, Slip Form Paver, Pav-Saver Place Spreader, Front Loader or Equal.

1. Crown StaLok® Paving Material. Slope material to edge ¼” per foot.
2. Pockets of large aggregate may develop, inspect surface and evenly spread any 1/4” or 3/8” loose rock.

E. Compact StaLok® Paving Material.

1. Compaction can be achieved by a 1 to 5-ton double-drum roller
2. Lightly compact making one pass.
3. Make any grade adjustments and add needed material.
4. Heavily compact material making 8 to 10 passes. Avoid turning on material with roller.
5. Use plate compactor on edges and hard to get areas. If near wall, hand tamp may be necessary.
6. Loose material shall not be present on final surface.
7. No set up or curing time is needed.

3.4 INSPECTION

- A. Finished surface shall be uniform and solid, with no evidence of chipping or cracking. Compacted paving material shall be firm to full depth with no soft areas. Loose material shall not be present on the surface and no ruts shall be present. Compaction may increase with time and use.

3.5 MAINTENANCE

- A. Remove debris, such as paper, grass clippings, leaves or other organic material by mechanically blowing or hand raking the surface as needed. Any plowing program required during winter months shall involve the use of a rubber baffle on the plow blade or wheels on the plow that lifts the blade 1/4" off the paving surface.

3.6 REPAIRS

- A. Excavate damaged area to the depth of the StaLok® Paving Material and square-off sidewalls.
- B. If area is dry, moisten damaged portion lightly and scarify.
- C. Apply pre-blended StaLok® Paving Material to excavated area to finish grade.
- D. Compact with an 8” to 10” hand tamp or 1000 lb. Roller.

END OF SECTION 32 15 40

- temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.6 CONCRETE FINISHING

- A. After darbying or bullfloating, stop finishing until bleeding has ceased and until concrete can support foot pressure with only about one eighty-inch (1/8") indentation. During or after the first floating, check planeness of surface with a ten foot (10') straightedge applied at not less than two different angles, and then cut down all high spots and fill all low spots to achieve a true plane within one eighty-inch (1/8") in ten feet (10').
- B. Finishes:
 1. Medium Broom Finish: Provide a medium broom finish for all exterior concrete unless otherwise noted. Immediately after float finishing and tooling control joints, roughen surface with fiber-bristle broom to match the approved mockup panel. Confirm direction or pattern of broom finish with the Project Manager prior to commencing slab placement.
- C. Accessible Ramps:
 1. Provide score joints in handicap ramps, tooled in a pattern in accordance with standard Denver Public Works standards.
 2. Install truncated dome inserts flush with the adjacent ramp surface in accordance with standard Denver Public Works standards, taking care to achieve a tight bond with the concrete, free of air pockets.

3.7 CONCRETE CURING, PROTECTION AND SURFACE TREATMENTS

- A. Refer to the list of curing materials in section 2.11. Apply curing materials as specified by the manufacturer.
- B. General:
 1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Maintain concrete with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of concrete.
 2. Curing shall commence as soon as free water has disappeared from the concrete surface after placing and finishing. The curing period shall be seven days for all concrete unless test cylinders, made and kept adjacent to the structure and cured by the same methods, are tested with the average compressive strength equal to seventy percent (70%) of the specified twenty eight (28) day strength.
 3. Curing shall be in accordance with ACI 301 procedures. Avoid rapid drying at the end of the curing period. During hot and cold weather, cure concrete in accordance with ACI 305R and ACI 306R.
- C. Curing Methods: Perform curing of concrete by moisture curing, by moisture-retaining cover curing, by curing compound, and by combinations thereof, as herein specified. Coordinate with

and choose a curing method that is compatible with the requirements for subsequent material usage on the concrete surface.

1. Provide moisture curing by one of the following methods:
 - a. Keep concrete surface continuously wet by covering with water.
 - b. Continuous water-fog spray.
 - c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping it continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.
 2. Provide moisture retaining cover curing as follows: Cover concrete surfaces with a moisture-retaining cover for curing concrete, placed in widest practical width with sides and ends lapped at least 3-inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 3. Provide curing and sealing compound to exterior slabs, walks, curbs, etcetera as follows:
 - a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within thirty (30) minutes). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to rainfall within three hours after initial application.
 - b. Maintain continuity of coating and repair damage during period.
- D. Curing Formed Surfaces: Where wooden forms are used, cure formed concrete surfaces by moist curing with forms in place for full curing period or until forms are removed. When forms are removed, continue curing by methods specified above for specified curing time.

3.8 JOINTS

- A. Construct joints true to line with faces perpendicular to surface.
- B. Expansion Joints: Expansion joint material shall be provided at the following locations and shall be in place prior to the placing of concrete:
1. As shown on the Contract Drawings; or
 2. At each end of curb return.
 3. Between sidewalk and driveway slabs or service walks.
 4. Between new concrete and existing concrete.
 5. Between new concrete and fixed vertical objects.
 6. At maximum one hundred twenty foot (120') spacing.
 7. As directed by Project Manager.
 8. Thoroughly clean all surfaces prior to installation of sealant material.
- C. Speed Dowels:
1. Attach bases to the face of concrete forms using a double-headed nail or self-tapping screw.
 2. Center of base shall be centered on form.
 3. Prior to pouring concrete, Speed Dowel sleeve shall be slipped over base.
 4. Pour concrete minimum eighteen-inches (18") from Speed Dowel system and work concrete around the Speed Dowel System.

5. Concrete forms shall be removed with bases still attached. Bases may be reused.
6. Install slip dowels to the full depth of the embedded Speed Dowel sleeve and proceed with next concrete pour.
7. Greasing of dowels is not required. Embedded Speed Dowel Sleeve accommodates expansion and shrinkage movements that may occur.
8. Bent or badly sheared slip dowels shall not be used. Saw cut dowels recommended.
9. Concrete shall not be poured directly over the Speed Dowel System.
10. Place edge forms plumb. Out of plumb forms may result in misaligned dowels.

D. Contraction (Control) Joints in Walks: Contraction joints shall be formed with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut one eighth-inch (1/8") wide joints into concrete that has hardened sufficiently that cutting action will not tear, abrade, or otherwise damage surface, but before development of random contraction cracks. Sawed cut joints shall be spaced at a distance equal to the width of the walk, but not over ten feet (10') unless approved by the Project Manager. Depth of joints shall be one-fourth (1/4) the slab thickness.

1. Tooled joints will not be allowed on concrete trails, unless directed by the Project Manager.

E. Curb and Gutter Contraction (Control) Joints: Space curb and gutter joints not more than twelve foot six-inches (12'-6") on center, and align them with sidewalk joints. Contraction joints shall be tooled. Form plane of weakness by inserting and later removing a metal divider, finish with an edger or groover, or by saw cutting a previously tooled joint.

3.9 FORM REMOVAL

- A. Remove forms after concrete surface is hard enough so as not to be damaged in any way. Reasonable care is to be used in removing forms. Repair minor defects with high strength grout as per Project Managers direction. Plastering will not be permitted on exposed faces.

3.10 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Project Manager.
- B. Drill test cores, where directed by Project Manager, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

3.11 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117, the drawings, and as follows:
1. Elevation: In conformance with grading plans.
 2. Thickness: Plus three eighths-inch ($3/8''$), minus one quarter-inch ($1/4''$).
 3. Surface: Gap below ten foot (10') long, unlevelled straightedge not to exceed one eighty - inch ($1/8''$).
 4. Lateral Alignment and Spacing of Dowels: one-inch (1").
 5. Vertical Alignment of Dowels: one quarter-inch ($1/4''$).
 6. Joint Spacing: three-inches (3").
 7. Contraction Joint Depth: Plus one quarter-inch ($1/4''$), no minus.
 8. Joint Width: Plus one eighth-inch ($1/8''$), no minus.

END OF SECTION 32 13 13

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SECTION 32 80 00**IRRIGATION SYSTEMS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes the requirements for the installation of an underground irrigation system including the following:
 - 1. Trenching, stockpiling excavation materials, refilling and compacting trenches.
 - 2. Complete irrigation system including but not limited to piping, valves, fittings, heads and wiring, sensors, backflow preventer(s), Automatic Irrigation Controller(s) and final adjustments to insure complete coverage.
 - 3. Water connections.
 - 4. Replacement of unsatisfactory materials.
 - 5. Cleanup, inspections, and approval.
 - 6. Testing.
- B. Related Sections:
 - 1. Division 01 Section "Contractor Quality Control".
 - 2. Division 01 Section "Erosion and Sedimentation Control".
 - 3. Division 01 Section "Tree Retention and Protection".
 - 4. Division 31 Section "Excavation and Backfilling of Trenches".
 - 5. Division 32 Section "Concrete Walks, Curbs, and Miscellaneous Flatwork".
 - 6. Division 32 Section "Soil Preparation".
 - 7. Division 32 Section "Topsoil".
 - 8. Division 32 Section "Turfgrass Seeding".
 - 9. Division 32 Section "Sodding".
 - 10. Division 32 Section "Trees, Plants, and Groundcovers".

1.3 REFERENCES

- A. Conform to requirements of reference information listed below except where more stringent requirements are shown or specified in Contract Documents.
 - 1. American Society for Testing and Materials (ASTM) - Specifications and Test Methods specifically referenced in this Section.
 - 2. Underwriters Laboratories (UL) - UL Wires and Cables.
 - 3. National Sanitation Foundation (NSF) – Piping and backflow prevention.
 - 4. American Water Works Association – Piping and backflow prevention.

1.4 QUALITY CONTROL

- A. Special Requirements.

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1. Tolerances: Specified depths of mains and laterals and pitch of pipes shall be installed per the Contract Drawings and specifications.
2. Compaction: Settlement of trenches is cause for removal of finish grade treatment, refilling, compaction, and repair of finish grade treatment.
3. Coordination with Other Contractors: Protect, maintain, and coordinate work with work under other Sections.
4. Damage to other Improvements: Contractor shall replace or repair damage to grading, soil preparation, seeding, sodding, planting and/or new site features done under other Sections during Work associated with installation of irrigation system at no additional cost to the City.
5. Damage or Disturbance to the Existing Irrigation Components: Damage to existing components as a result of work being performed by the Contractor will require the Contractor to replace the damaged components to the Cities current standards, at no additional cost to the City. This includes boxes, manifolds, valves, angle valves, risers, wire, heads, pipe, and autom.
6. Water Delivery Interruption: When working on an existing irrigation system, the Irrigation Contractor shall contact the Project Manager and inform him seventy two (72) hours in advance of any water interruption that is required. The maximum irrigation system interruption is to be no more than seventy two (72) hours during the growing season. The contractor shall make all necessary provisions including material, equipment, labor, delivery and scheduling as required to complete all points of connection, upgrades, and improvements within seventy two (72) hours.
7. Watering: The Contractor is responsible for following all Denver Water rules and regulations for sod and seed establishment, available at <http://www.denverwater.org>. The Contractor shall post signage per Denver Water in a visible location(s) on site indicating "IRRIGATION TESTING AND MAINTENANCE IN PROGRESS" when Work (establishment, construction or warranty) requires irrigation system operation between the hours of 10 AM to 6 PM. The signs are to be used are available from Denver Water.
8. Permits: Work involving plumbing for installation of copper piping, ductile iron piping, backflow preventer(s), and related Work shall be executed by licensed and bonded plumber(s). Secure a permit at least forty eight (48) hours prior to start of installation. Work involving high voltage electrical wiring, grounding and related Work shall be executed by licensed and bonded electrician(s). Secure a permit at least forty eight (48) hours prior to start of installation
9. Refer to maintenance requirements for water during construction, 1.9.B.1.

B. Pre-Construction Conferences and Site Meetings:

1. Contractor shall schedule and conduct a pre-construction conference to review in detail quality control and construction requirements for equipment and materials used to perform the Work. Conference shall be scheduled not less than ten (10)-days prior to commencement of Work. All parties required to be in attendance shall be notified no later than seven (7) days prior to date of conference. Contractor shall notify qualified representatives of each party concerned with that portion of Work to attend conference, including but not limited to the Project Manager, Denver Parks Superintendent, Operations Supervisor, Water Conservation, Contractor's Superintendent, and Installer.
2. Prior to commencement of Work, Contractor shall schedule an on-site conference with Project Manager, Denver Forestry and any other parties designated by Project Manager to discuss tree protection requirements, marshalling locations, traffic control, and equipment access. Provide a minimum of seven (7) days notice prior to date of conference.

3. Contractor shall schedule on-site conferences the frequency of which is to be determined by the Project Manager and any other parties designated by the Project Manager to review project progress.
4. Contractor shall record Minutes of each conference and distribute to all parties in attendance within three (3) days of conference.

1.5 FIELD QUALITY CONTROL

- A. Flushing: After piping, risers, and valves are in place and connected, but prior to installation of sprinkler heads, quick coupler assemblies, and hose valves, thoroughly flush piping system under full head of water pressure from dead end fittings. Maintain flushing for five (5) minutes through furthestmost valves. Cap risers after flushing.
- B. Testing Pressurized Mainline: Prior to installing any plant materials (sod, seed, trees, shrubs, perennials) arrange and conduct pressure test(s) in the presence of the Project Manager. Arrange for testing a minimum of forty eight (48) hours in advance. The contractor is responsible to supply the hydrostatic test pump and all other equipment required to complete the test.
 1. Set in place, cap and pressure test all piping under paving, in presence of the Project Manager prior to backfilling and paving operations.
 2. After backfilling and installation of all control valves, fill pressure supply line with water, and pressurize to forty (40)-PSI over the designated static pressure or one hundred twenty (120)-PSI, whichever is greater, for a test period of two (2)-hours.
 3. All isolation valves, angle valves, ball valves and zone valve flow controls are to remain open during testing.
 4. Leakage, Pressure Loss:
 - a. Solvent welded PVC Pipe: Test is acceptable if zero pounds of pressure is evident during the test period.
 - b. Ring Tight Pipe: Test is acceptable if two (2) pounds of pressure or less is evident during the test period.
 5. Leaks: Detect and repair leaks. Replace defective PVC pipe with new full length pipe section. No pipe splices will be accepted within pipe sleeve. No PVC pressure couplings or slip-fix repair couplings will be allowed.
 6. Retest system until test pressure can be maintained for duration of test.
- C. Walk-Through for Substantial Completion:
 1. Arrange for the Project Manager to be present. Provide minimum of forty eight (48) hours notice in advance of walk-through.
 2. Entire system shall be completely installed and operational and trenches shall be finish graded and sod and seed in place prior to scheduling of walk-through.
 3. Electrically operate each zone in its entirety for the Project Manager the time of walk-through.
 4. A project inspection walk through shall include but is not limited to the following:
 - a. Contractor shall adjust, straighten and nozzle all heads prior to walk through. Review operation, coverage, head/nozzle adjustment, and system adjustment per specifications.
 - b. Contractor shall have all valves boxes unlocked prior to walk through. Open valve boxes to confirm materials, filter fabric, gravel bedding, wire splices, compaction,

elevation, workspace access within boxes, clearance from lid and bedding, locking mechanisms, and zone branding. Interior of boxes should be free of foreign material, only filter fabric shall be visible in the bottom of boxes. All valves must be tagged with zone identification, Christy's valve marker tags or equal and valve box lids must be branded with zone valve identification. Verify connections in all valve and wire splice boxes.

- c. Contractor shall provide documentation that resistance tests for all spare common and hot wires has been performed and the results for each OHMS reading on each wire tested.
- d. Confirm irrigation heads are at specified elevation and distance(s) from paved surfaces and curbs, plumb and soil compacted.
- e. Inspect concrete size and elevation of pads for backflow assemblies, master valves, and enclosure pads. Confirm quality of concrete, finishes, access to the Automatic Irrigation Controller and spare conduit/sleeving as required for wiring.
- f. Review trench and related excavation repair including backfill, compaction, fine grade, seed and sod installation.
- g. Review appropriate use of purple valve lids and other product as required for reuse water applications.
- h. Generate a punch list of items to be corrected prior to Final Completion.
- i. Furnish all materials and perform all work required to correct all inadequacies of coverage due to deviations from Contract Documents.

D. Walk-Through for Final Completion:

- 1. Arrange for Park Operations Supervisor, the Project Manager and Consultant to be present a minimum of seventy two (72) hours in advance of walk-through.
- 2. Show evidence to the Project Manager that the City has received all maintenance items and accessories, charts, record Contract Drawings, equipment, backflow certification reports and Automatic Irrigation Controller grounding assembly certificates as required before Final Completion walk-through is scheduled.
- 3. Operate each zone, in its entirety for the Project Manager at time of walk-through to insure correction of all incomplete items.
- 4. Items deemed not acceptable by the Project Manager shall be reworked to complete satisfaction of the Project Manager.
- 5. If after the walk-through for Final Completion of irrigation system the Project Manager finds items which have not been properly adjusted, reworked, or replaced per the previous punch list, the Contractor shall be charged for all subsequent walk-throughs. Funds will be withheld from final payment and/or retainage to Contractor, in amount equal to additional time and expenses required to conduct and document additional walk-throughs by Project Manager to ensure compliance with Contract Documents.

1.6 SUBMITTALS

- A. Prepare and make submittals in accordance with conditions of the Contract prior to installation of any irrigation equipment:
- B. Material List: Submit a PDF file of complete list of materials, and cut sheets indicating manufacturer, model number and description of all materials and equipment to be used. Show appropriate dimensions and adequate detail to accurately portray intent of construction.

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- C. Shop Contract Drawings: If applicable, submit shop Contract Drawings for pumps, backflows and assemblies. Include plumbing and foundation/support systems if the installation differs from the manufacturer's recommended installation.
- D. Mock Ups:
 - 1. Valve clusters: Provide a completely built electrical valve cluster. This mockup, to include three electric valves, angle valve, manifold, unions and riser, the mock up may be incorporated into the work toward the end of the project.
 - 2. Swing joints: Provide a pre-manufactured or constructed swing joint assembly for each detail shown (eg. - quick coupler, rotors) or as directed by the Project Manager
 - 3. Drain valves: Provide a mock up including the service tee, and required fittings, and drain valve.
 - 4. Other: Mock ups that may be requested by the Project Manager.
- E. Operation and Maintenance Manual: Coordinate scheduling/precipitation instructions with the City's operations staff. Submit three (3) bound manuals and one (1) digital copy to the Project Manager including:
 - 1. Winterization and spring start-up procedures.
 - 2. Cut sheets of products.
 - 3. Manufacturer's maintenance and checking instruction for backflow preventer (if applicable).
 - 4. Manufacturer's maintenance and operation instruction for pump station (if applicable).
- F. Warranty: Submit two year written warranty, in accordance with Paragraph 1.8 below-
CONTRACT RECORD DRAWINGS.
- G. Prior to the installation of irrigation system, the Contractor will provide on-site copies of original irrigation design Contract Drawings "Record Contract Drawings". Contractor to revise Record Contract Drawings in red ink as Work progresses to show any changes to the plan and include field dimensions.. Record Contract Drawings shall be brought up-to-date prior to any Pay Application Submittals that contain irrigation installation. Should the Contractor choose to utilize GPS for the purposes of documenting Work in progress, a hard copy print will need to be provided prior to Pay Application Submittal. A print of Record Contract Drawings shall be available at Project Site for review by the Project Manager at any time during the project.
- H. Record Contract Drawings shall encompass entire scope of work including any altered existing equipment and altered zones, and notate the Automatic Irrigation Controller zone number, type of irrigation, GPM, operating PSI for any altered or added zone.
- I. Preparation of Contract Record Drawings: Dimension from two permanent points of reference (building corners, sidewalk, road intersections or permanent structures) the location of the following items:
 - 1. Point of connection.
 - a. Meters and vault dimensions
 - b. Curb Stops
 - c. Isolation Valves
 - d. Drain Valves
 - e. Pumps
 - f. Backflows

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- g. Bypass lines
 - h. Service lines
 - 2. Routing of irrigation mainline. Provide dimensions for each one-hundred linear feet (100 L.F.) maximum along each routing and for each change of direction.
 - 3. Routing of non-pressure lateral lines, layout and size.
 - 4. Sprinkler control valves.
 - 5. Quick coupling valves.
 - 6. Drain valves
 - 7. Master valves
 - 8. Flow sensors
 - 9. Rain sensors/weather station
 - 10. Wire splice boxes
 - 11. Control wire routing if not with pressure mainline.
 - 12. Gate valves.
 - 13. Air relief valves.
 - 14. Sleeves.
 - 15. Flush valves.
 - 16. Power service drop.
 - 17. Other related equipment as directed.
 - 18. Two-wire grounding rods
- J. Make dimensions accurately at the same scale used in the original Contract Drawings, or larger. Notes and dimension lettering must be legible.
- K. The irrigation legend must be changed to accurately reflect the irrigation equipment installed, if such equipment is not the same as originally specified on the contract documents. This includes flow rates, effective spray diameter/radius and operating pressure of all sprinkler heads.
- L. The Project Manager will not certify any pay request submitted by the Contractor if the Contract Record Drawings are not current, and processing of pay request will not occur until Contract Record Drawings are updated.
- M. Final Submittal: Upon completion of Project, prior to final acceptance, secure digital copy of irrigation design from the Project Manager and record installation information that reflects all changes made over the course of the construction project, prepared by a qualified draftsman. Contract Record Drawings shall include details, including any revisions as per actual installation. Deliver and submit to the Project Manager for review the following items:
- 1. Digital Contract Record Drawings in both PDF and AutoCAD release 2007 bound format (include any related X-ref files, plot files and pen settings.) Make any additional changes to the file as directed by the Project Manager prior to final submittal and approval.
- N. Request for final payment will not be certified or processed until all Contract Record Drawing prints and digital files have been received and approved.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Packing and Shipping: Deliver all components to job site in original unopened packaging containers prominently displaying manufacturer's name, volume, quantity, contents,

instructions, and conformance to local, state, and federal law. Remove and replace cracked, broken, or contaminated items or elements prematurely exposed to moisture, inclement weather, snow, ice, temperature extremes, fire, or jobsite damage.

- B. Handling, Storage, and Delivery of PVC Pipe:
 - 1. Exercise care in handling, loading and storage of PVC pipe.
 - 2. Provide forty eight (48) hours advance notice of delivery to the Project Manager for observation of unloading and handling of PVC materials during delivery.
 - 3. All PVC pipe shall be transported in a vehicle which allows length of pipe to lie flat so as not to subject it to undue bending or concentrated external loads. All sections of pipe that have been dented or damaged shall be discarded, and shall be replaced with new piping.
- C. Storage and Protection: Deliver, unload, store, and handle materials, packaging and bundling products in dry, weatherproof condition in manner to prevent damage, breakage, deterioration, intrusion, ignition, and vandalism.
- D. Only materials and equipment meeting project specifications and to be used as part of Project shall be stored on site. Project Manager to may verify at any time during construction period.

1.8 JOBSITE CONDITIONS

- A. Existing Conditions:
 - 1. Soil Conditions: The Contractor is responsible for investigating the type of soil and conditions in which lines are to be installed. No extra payment will be allowed due to difficulty in trenching, unless approved by the Project Manager.
 - 2. Contractor is responsible for understanding the scope of related operations as specified and indicated in the Contract Drawings and Specifications before beginning Work under this Section.
 - 3. Report unsatisfactory conditions in writing to the Project Manager within twenty four (24) hours of discovery. Commencement of installation means acceptance of existing conditions by the Contractor.
- B. Protection of Property:
 - 1. Protect buildings, walks, walls, and other property from damage. Erect and maintain barricades, warning signs and lights, and provide guards as necessary or required to protect all persons on the site. Damage caused to asphalt, concrete, monuments, structures or other building material surfaces shall be repaired or replaced at no cost to the City. Restore disturbed areas to original condition.
 - 2. The Contractor is responsible for potholing of all existing utilities, irrigation lines or any other underground improvements that may be damaged due to the installation of Irrigation Systems.
- C. Protection of Existing Trees:
 - 1. Refer to Division 01 Section "Tree Retention and Protection".
 - 2. Consult with the Denver City Forester as requested by the Project Manager prior to trenching or boring within tree drip-lines. All trenching or work under drip line of any tree shall be dug by hand or by other methods as directed by the Forester or the Project Manager so as to prevent damage to limbs or branches and root system.

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3. Directional boring that is permitted within tree protection area must occur at thirty six inches (36") below grade and may not take place anywhere within four feet (4') of the drip line. Any exception must be agreed upon by the Denver City Forester or the Project Manager.

D. Protection and Repair of Underground Lines:

1. Request utility locates seventy two (72) hours in advance of any excavations by calling the Utility Notification Center of Colorado at 811. Take whatever precautions are necessary, including pot holing to verify location and depth to protect these underground lines from damage. If damage does occur, all damage shall be repaired by the Utility Owner. All costs of such repairs shall be paid by Contractor.
2. The Contractor is required to contact all private utility companies including Denver City Departments to locate all private utilities. The request for locates shall be a minimum of seventy two (72) hours prior to proceeding with any excavation. If, after such requests private utilities are encountered and damaged by the Contractor these shall be repaired at no cost to the City. If the Contractor damages staked or located private utilities, they shall be repaired by the Utility Owner at the Contractor's expense.

- E. Replacement of Paving and Curbs: Any damage do to work that occurs adjacent to or crosses existing roadways, paths, trails, curbing, sidewalks, etc. shall be restored to original condition at the contractors expense, and the satisfaction of the Project Manager.

1.9 WARRANTY/GUARANTY

- A. Provide a two year written warranty for material and installation from date of Substantial Completion.
- B. Expenses due to vandalism before Final Acceptance shall be the Contractor's responsibility.
- C. Any settling of backfilled trenches that occurs during warranty period shall be repaired at no expense to the City, including complete restoration of damaged property.
- D. Once final acceptance is granted, the City will maintain turf and planting areas during warranty period, unless maintenance by Contractor is specified in the contract. Contractor is responsible to monitor and coordinate Automatic Irrigation Controller scheduling and maintenance with Project Manager for any seeding, sodding or planting areas under Contractor's warranty.
- E. Project Manager reserves the right for his staff to make temporary repairs during the warranty period as necessary to keep systems in operating condition without voiding the Contractor's warranty, nor relieving the Contractor of his responsibilities.
- F. Contractor shall make repairs and replacements within three days of notification. If Contractor fails to make repairs within three days, the City will make such repairs at Contractor's expense.

1.10 TURN OVER ITEMS

- A. Where applicable, furnish the following maintenance items to City prior to Final Acceptance:
 1. Two (2) sprinkler heads for each size and type specified.
 2. Two (2) nozzles for each type of head.
 3. Two (2) head adjustment tools for each type of head installed.

4. Two (2) valve keys for operating each type of manual valve. (Manual drain valves, isolation valves).
5. Two (2) valve keys and hose swivels for each type of quick coupling valve.

1.11 MAINTENANCE DURING PROJECT CONSTRUCTION

- A. Within Limits of Construction: Contractor shall fence, water, and keep weed free any turf, trees and any plantings within the limits of construction. Contractor is responsible for maintenance which includes picking up trash, weed control and mowing of turf and native areas within the limits of construction. Contractor is responsible for watering existing landscape within limits of construction. Turf and plants affected by mainline work or irrigation water service shutdown during irrigation season shall receive watering per Parks' schedule, with no interruption of watering greater than seventy two (72)-hours. Contractor is responsible for maintenance until final acceptance is granted.
- B. Outside Limits of Construction: Coordinate Automatic Irrigation Controller scheduling and maintenance operations with Project Manager for portions of City property unaffected by construction.
- C. Additional Maintenance During Warranty Period:
 1. Make repairs and replacements needed due to defective workmanship and materials.
 2. Winterization: Include cost in bid for winterizing complete system at conclusion of irrigation season (during which system received final acceptance) within three (3)-days of notification by the City. System shall be voided of water using compressed air or similar method accepted by the Project Manager. Coordinate with the Denver Parks Operations Supervisor and the Project Manager to be present during the winterization procedures. The Contractor shall notify all persons that are to be present at the winterization a minimum of forty eight (48) hours prior to the winterization of the system.
 3. Spring Start Up: Reopen, operate, adjust system malfunctions and make any necessary system repairs, the following season within three (3) days of notification by the City. Coordinate with the Denver Parks Operations Supervisor and the Project Manager to be present during the spring start up procedures. The Contractor shall notify all persons that are to be present at the spring start up a minimum of 48-hours prior to starting of the system.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Equipment must have performance characteristics to operate per the design conditions indicated. If any discrepancy or conflict exists between the quantities of equipment listed in the schedule and quantities shown on the Contract Drawings, the greater quantity shall govern.
- B. All material shall be of the highest grade possible and where applicable, shall be marked accordingly and shall be new.

2.2 PIPE AND PIPE FITTINGS

- A. Main and Lateral Lines:

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1. Main Lines (pressurized, downstream of backflow prevention units):
 2. Class 200 PVC BE, size one inch (1") to two and one half inch (2-1/2").
 3. Class 200 PVC RT/Gasketed, size three inches (3") and greater).
 4. Velocities in PVC mainline shall not exceed five feet (5') per second.
 5. All PVC pipe shall conform to the requirements of the United States Department of Commerce commercial standard Type 1-ASTM-D-2241.
 6. Lateral Lines: One hundred 100 PSI High Density NSF Polyethylene Piping – one inch (1") minimum diameter.
 - a. Velocity of water flow in polyethylene pipe shall not exceed seven and one half (7-1/2) feet per second.
- B. Sleeving:
1. Horizontal sleeves under paved surfaces: Class 200 PVC.
 2. Vertical sleeves for access to drains and valves: Class 200 PVC.
 3. Horizontal sleeving for boring applications: HDPE.
- C. Brass Pipe and Fittings:
1. Brass Pipe: Eighty five percent (85%) red brass, ANSI Schedule 40 screwed pipe.
 2. Fittings: Medium brass, screwed one hundred twenty five (125) pound class.
- D. Plastic Pipe and Fittings:
1. Identification Markings: Identify all pipe with following indelible markings:
 - a. Manufacturer's name.
 - b. Nominal pipe size.
 - c. Schedule of class.
 - d. Pressure rating.
 - e. NSF (National Sanitation Foundation) seal of approval.
 - f. Date of extrusion.
 2. Class 200 PVC Pipe (pressurized main line two and one-half inches (2-1/2") and under):
 - a. Pipe will be assembled with Schedule 80 PVC fittings using ASTM-F-656 purple primer followed with heavy bodied ASTM-D-2564 glue.
 - b. Fittings shall be installed with concrete thrust blocks as per Details.
 3. Gasketed End Pipe (pressurized main line 3-inches and larger): Manufactured from virgin Polyvinyl Chloride compound in accordance with ASTM D2241 and ASTM D1784; cell classification 1254-B, Type 1, Grade 1.
 - a. All fittings and service tees, three inches (3") and larger: Harco or Leemco ductile iron, grade 70-55-05 in accordance with ASTM A-536. Fittings shall have deep bell push-on joints with factory installed gaskets meeting ASTM F-477.
 - b. Lubricant: As recommended by manufacturer of pipe fittings.
 - c. Pipe Restraints on all fittings and service tees and pipe to pipe restraints: Harco or Leemco, installation as recommended by the manufacturer. Each fitting bell shall be restrained to the pipe inserted in it per manufacturer's recommendations. See Manufacturer catalog for appropriate selection or chart supplied on plans.
 4. Flexible Plastic Pipe (non-pressure lateral lines):

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- a. Manufactured from virgin polyethylene in accordance with ASTM D2239, designated as PE 3408. Maximum size two inches (2"); minimum size one inch (1").
- b. Fittings: Manufactured in accordance with ASTM D2609; PVC Type 1 cell classification 12454-B.
- c. Clamps: All stainless steel worm gear screw clamps. Use two (2) clamps per joint on all insert fittings.
- d. Non-Potable water systems – Install Christy's TA-DT-3-PRW marking tape in all trenches containing polyethylene lateral piping. Install at six inch (6") depth.
- e. Risers for Pop-up Heads: Shall be swing pipe, 0.49 ID, operating pressure of eighty (80) PSI, manufactured by Rainbird or approved equal.

2.3 VALVES

A. Automatic Control Valve:

1. Automatic Valve for Non-Potable Water System: Rain Bird PESB Series Valve. PRS-D shall be used if pressure at the heads is greater than ten (10) pounds over the optimal pressure as stated per the manufactures catalog, plans or measured in the field.
2. Manifold: Manifold to be constructed out of Schedule 80 PVC pipe, fittings, and nipples. Use ductile iron riser nipple and Champion angle valve brass body 200RS angle valve with brass unions as per details and plans.
3. Install one flexible marker tag on each valve. Mark each tag with inedible ink indicating zone number. Tags shall be: Potable water systems (yellow Christy's ID-MAX-Y1-PW014), Non-potable systems (purple Christy's ID-MAX-P1-NP011)

B. Quick Coupling Valves:

1. Buckner "Wing Thing" Q44LCAR10 brass two-piece body with winged stabilizer, designed for working pressure of one hundred fifty (150) PSI; one inch (1") FIP.. Size as shown on drawing.
2. Quick Coupling Valves immediately after the backflow shall be used for winterization and shall be constructed of all brass swing joint and fittings. All other Quick Coupling Valve swing joints shall be constructed as shown on the details.

C. Valve Boxes:

1. All valve boxes will have a stainless steel hex bolt locking system.
2. Isolation Valves, Quick Coupling Valves, Drain Valves, Wire Splices and Ground Rods: Carson Brooks, Model #910-4, ten inch (10") round box.
 - a. Brand Lids as follows:
 - 1) Isolation/Gate Valve "GV"
 - 2) Quick Coupler Valve "QC"
 - 3) Manual Drain Valve "DV"
 - 4) Air Relief Valve "AR"
 - 5) Master Valve "MV"
 - 6) Flow Sensor "FS"
 - 7) Wire Splice Box "SB"
 - 8) Grounding Rod "GR"
 - 9) Filter "FIL"
3. Electric Control Valve Box: Shall have locking cover branded with the zone numbers.

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- a. Single valve location only, three-quarter inch (3/4") through two inch (2"): Carson Brooks, Model #1220 jumbo box with bolt down T-cover.
- b. Multiple valve clusters, maximum three (3) control valves per box: Carson Brooks, Model #1730-18 box with bolt down T-cover.
4. Box color for valves:
 - a. Green for potable systems.
5. Gravel Leveling Bed and Drainage Sump in Valve Boxes: three quarters inch (3/4") crushed gravel lined in geo-textile, as indicated on Contract Drawings.

2.4 SPRINKLER HEADS

- A. Heads: Provide fabricated riser units of the type and size as indicated on the Contract Drawings. Heads of a specific type or function in the system shall be of the same manufacturer and shall be marked with the manufacturer's name and identification in such a position that they can be identified without being removed from the system.
 1. Pop-Up Sprinkler Heads in turf areas: 1806 SAM-PRS.
 2. Pop-Up Sprinkler Heads in native grass areas and flower bed areas: Rain Bird 1812 SAM-PRS.
 3. Pop-Up Sprinkler Nozzles shall be Rain Bird MPR Series nozzle. Strip series, rotary, and VAN nozzles may be used for specific approved applications at the direction of the Project Manager.
 4. Gear Driven Heads: Rain Bird 5000 Plus, 8005 series with stainless steel risers, internal check valve, PRS and MPR as specified per Contract Drawings. Riser height shall be six inches (6") in turf areas, and twelve inches (12") stainless steel in native seed areas.
- B. Flexible Connectors to Lateral Pipe:
 1. Pop-up Heads: Shall be one-half inch (1/2") swing pipe, connected to lateral pipe with male x insert spiral barbed ell PVC insert fittings.
 2. Gear Driven Heads: Shall be field constructed PVC swing joints as per detail, connected to lateral pipe with PVC insert fittings.

2.5 AUTOMATIC CONTROL SYSTEM

- A. Existing Controllers, no work required.
- B. Electrical Control Wiring:
 1. Low Voltage:
 - a. Electrical Control Wire for 24VAC solenoid: Golf Course Sprinkler Wire - #14 to #10 AWG UL approved direct burial solid conductor copper wiring with polyethylene insulation 0.045-inch thickness.
 - b. Electrical Common Wire: Golf Course Sprinkler Wire - #12 AWG UL approved direct burial solid conductor copper wiring with polyethylene insulation 0.045-inch thickness.
 - c. Wire Colors: Consistent color system throughout.
 - 1) Control Wires – Black.
 - 2) Common Wires – White.

SECTION 32 91 13**SOIL PREPARATION****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes requirements for the preparation of soil for the purpose of seeding, sodding, or planting operations.
 - 1. Soil preparation consists of ripping, fertilizing, soil conditioning and fine grading the topsoil. Soil preparation as specified herein **MUST** precede all seeding, sodding, and planting.
- B. Related Sections:
 - 1. Division 01 Section "Erosion and Sedimentation Control".
 - 2. Division 31 Section "Earth Moving"
 - 3. Division 32 Section "Topsoil".
 - 4. Division 32 Section "Turfgrass Seeding".
 - 5. Division 32 Section "Sodding".
 - 6. Division 32 Section "Trees, Plants, and Groundcovers".

1.3 DEFINITIONS

- A. Fertilizer: A substance that is added to soil to help the growth of plants.
- B. Soil Amendment: Any substance which is intended to improve the physical, chemical, or other characteristics of the soil
- C. Soil Conditioner: Combination of slow-release fertilizer, hummate, and Mycorrhiza

1.4 SUBMITTALS

- A. See Division 01 Section "Submittals" for submittal requirements.
- B. Soils Test Data: See Sections 1.6 through 1.9 of this specification.
- C. Product Data: For each type of product.
 - 1. Include recommendations for application and use.
 - 2. Include test data substantiating that products comply with requirements.
 - 3. Material Certificates: For each type of soil conditioner, soil amendment and fertilizer before delivery to the site, according to the following:
 - a. Manufacturer's qualified testing agency's certified analysis of standard products.

- D. Samples: For each bulk-supplied material, one (1) quart volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.
- E. Quality Control Submittals:
 - 1. Certificates: State, Federal and other inspection certificates shall accompany invoice for materials showing source or origin. Submit to Project Manager prior to acceptance of material.
 - 2. Material Analysis: Provide soil conditioner analysis performed no more than three months prior to delivery to site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened containers bearing manufacturer's guaranteed chemical analysis, chemical name, trade name, trademark and conformance to state law, bearing name and warranty of producer.
- B. Notify Project Manager of delivery schedule in advance so material can be inspected upon arrival at project site. Immediately remove unacceptable material from project site.

1.6 PROJECT/SITE CONDITIONS

- A. General: Do not perform work when climate and existing site conditions will not provide satisfactory results.
- B. Vehicular site access shall be limited to the area(s) indicated on the Contract Drawings or as defined by the Project Manager.
- C. Damage to turf, natural areas, pavements, irrigation systems, underground utilities, and other improvements shall be repaired by the contractor at no additional cost to the City.

1.7 QUALITY CONTROL

- A. Testing Agency Qualifications: Retain an independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.
 - 1. Laboratories: Subject to compliance with requirements, provide testing of materials in the Section by a qualified testing laboratory approved by the Project Manager. Submit Testing Agency qualifications to Project Manager for approval prior to construction.
 - 2. Multiple Laboratories: Work may be divided among qualified testing laboratories specializing in physical testing, chemical testing, and fertility testing. Submit Testing Agency qualifications to Project Manager for approval prior to construction.

1.8 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Contractor is responsible for specified tests.

- C. Soil will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.
- F. Inspection: Provide notice to the Project Manager requesting inspection at least seventy-two (72) hours prior to anticipated date of completion.
- G. Contractor shall be responsible for coordinating soil preparation inspections with Denver Water, call (303) 628-6682 at least seventy-two (72) hours prior to installing sod, seed or plantings.
- H. Deficiencies: The Project Manager will specify deficiencies to Contractor who shall make satisfactory adjustments and shall again notify Project Manager for final inspection.

1.9 SOIL-SAMPLING REQUIREMENTS

- A. General: Extract soil samples according to requirements in this article.
- B. Sample Collection and Labeling: Have samples taken and labeled by Contractor in presence of Project Manager and under the direction of the testing agency.
 - 1. Number and Location of Samples: Minimum of five (5) samples per acre collected randomly throughout the areas to receive similar soil preparation, including seed/sod, native seeding, planting beds, and gardens. Provide a map to the Project Manager of sampling locations prior to sampling for approval.
 - 2. Procedures and Depth of Samples: Collect samples to a depth of six inches (6") and combine in a clean plastic container.
 - 3. Mixing of Samples: Mix samples together thoroughly, removing plant debris and breaking up clods.
 - 4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

1.10 TESTING REQUIREMENTS

- A. General: Perform tests on soil samples according to requirements in this article.
- B. Physical Testing:
 - 1. Soil Texture: Soil-particle, size-distribution analysis by the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
 - a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
 - b. Hydrometer Method: Report percentages of sand, silt, and clay.
- C. Fertility Testing: Soil-fertility analysis shall include the following:
 - 1. Percentage of organic matter.
 - 2. CEC, calcium percent of CEC, and magnesium percent of CEC.
 - 3. Soil reaction (acidity/alkalinity pH value).

4. Buffered acidity or alkalinity.
5. Lime estimate.
6. Soil texture estimate.
7. Nitrogen ppm.
8. Phosphorous ppm.
9. Potassium ppm.
10. Manganese ppm.
11. Zinc ppm.
12. Iron ppm.
13. Boron ppm.
14. Copper ppm.
15. Sodium ppm, and sodium absorption ratio.
16. Soluble-salts ppm.
17. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
18. Other deleterious materials, including their characteristics and content of each.

- D. Recommendations: Based on the test results, state recommendations for soil treatments, soil amendments, and soil conditioners to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.
1. Fertilizers and Soil Amendment Rates: State recommendations in weight per one thousand (1,000) sq. ft. for six inch (6") depth of soil.
 2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per one thousand (1,000) sq. ft. for six inch (6") depth of soil.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.
- B. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 3. Do not move or handle materials when they are wet or frozen.
 4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil: Shall be as specified under Division 32 Section "Topsoil".

B. Soil Amendments:

1. For the purpose of bidding the Contractor shall assume all areas to receive soil amendments will be at four (4) cubic yards per one thousand (1,000) square feet. Once soils tests have been received and determination is made on the proper amount to be added the site specific soils the rate to be applied may be adjusted per the price based on the Schedule of Values for Soil Amendment.
2. Composted material shall consist of aged organic matter, free of weed or other noxious plant seeds, lumps, stones, or other foreign contaminants harmful to plant life, and having the following characteristics based on a nutrient test performed no longer than 3 months prior to its incorporation into the project:
 - a. Organic matter: twenty five percent (25%) maximum.
 - b. Salt content: Five (5.0) mmhos/cm maximum.
 - c. pH: 7.5, maximum.
 - d. Carbon to nitrogen ratio shall be less than 20:1.
3. Mountain peat, aspen humus, gypsum and sand will not be accepted.
4. Acceptable product: Class I compost, such as Ecogro or Bio-comp, as produced by A1 Organics, Eaton, CO, or approved equal.

C. Soil Conditioners:

1. For the purpose of bidding the Contractor shall assume all areas to receive Soil Conditioners will be applied at the rate specified by the manufacturer for each specific planting type. Once soils tests have been received and determination is made on the proper amount to be added the site specific soils the rate to be applied may be adjusted per the price based on the Schedule of Values for Soil Conditioner.
 - a. Organic slow release fertilizer (6-1-1), acceptable product: "Biosol" or approved equal.
 - b. Granular Humic Acid soil conditioner, acceptable product: "Menefee Humate Soil Conditioner".
 - c. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb (0.45 kg) of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb (0.45 kg) of ectomycorrhizal fungi, thirty three percent (33%) hydrogel, and a maximum of five and one half percent (5.5%) inert material.
 - d. Mycorrhizal Inoculant: AM-120, as manufactured by Reforestation Technologies International, locally available from Pawnee Buttes Seed, Greeley, CO, (970)356-7002.
 - e. Acceptable substitution.

2.2 FERTILIZER

A. General:

1. Fertilizer shall conform to applicable State fertilizer laws. It shall be uniform in composition, dry, and free flowing, and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Fertilizer that has become caked or damaged will not be accepted.

B. Turf Grass Lawns:

1. Diamonium phosphate (18-46-0). Nitrogen shall be composed of sulphur-coated Urea only. Provide in sufficient quantity to apply at the rate of one hundred (100) pounds nitrogen per acre, unless otherwise indicated by the soils tests.

2.3 PESTICIDE

- A. Post Emergent Pesticide: Roundup (Glyphosate) or approved equal as manufactured by Monsanto Company or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General: Verify that existing site conditions are as specified and indicated on Contract Drawings before beginning work under this Section.
 - 1. Grades: Inspect to verify rough grading is within +/-one tenth of one foot (0.1') of grades indicated and specified.
 - 2. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within the work area.
 - 3. Damaged Earth: If, upon inspection, the soil is found to be unfit to support planting as described in article 2. above, it is to be removed and replaced with clean soil from a source approved by the Project Manager.
- B. Unsatisfactory Conditions: Report in writing to General Contractor with copy to Project Manager.
- C. Acceptance: Beginning of installation means acceptance of existing conditions by installer.

3.2 PREPARATION

- A. Areas of Newly Placed or Existing Topsoil:
 - 1. Protection:
 - a. Locate sewer, water, irrigation, gas, electric, phone and other pipelines or conduits and equipment prior to commencing work.
 - b. Contractor shall be responsible for proper repair to landscape, utilities, walls, pavements and other site improvements damaged by operations under this section.
- B. Weed Control: Perform pesticide treatment over the entire area to be planted. Allow sufficient time to successfully complete the entire pesticide treatment process before proceeding with planting. Repeat procedure as needed as weed growth becomes evident throughout the duration of construction.
 - 1. Pesticide treatment must be completed during the growing season.
 - 2. Water surface one half inch (1/2") per week for two weeks prior to application if natural precipitation does not supply this amount to encourage weed seed germination.
 - 3. Treat site with pesticide in accordance with manufacturer's recommendations.
 - a. Two days after application water surface one half inch (1/2") per week if natural precipitation does not supply this amount to encourage weed seed germination.
 - b. Ten (10) days after the first Pesticide application, review surface for evidence of plant growth.

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- c. Repeat steps 2, 3, 4, and 5, up to three (3) applications, until there is no evidence of plant growth after a ten (10) day period.
 - d. Obtain Project Manager approval of surface conditions fourteen (14) days after last pesticide application.
 - e. Pesticide treatments beyond the three (3) applications shall be considered additional to the contract and will be performed at the directed of Project Manager after the City has approved the cost. Additional pesticide treatments required for imported topsoil shall be borne solely by the Contractor.
 - f. Remove plant debris from treated area.
 - g. Contact Project Manager forty eight (48) hours in advance to review the site after each pesticide treatment. Do not proceed with additional planting until the results are approved and accepted by the Project Manager.
 4. Surface Grade: Establish grades as indicated on Contract Drawings, and as required in Division 31 Section "Earth Moving".
 5. Remove weeds, debris, clods and rocks larger than one inch (1"). Remove and dispose of accumulated materials at direction of Project Manager.
 6. Erosion Control: Take measures and furnish equipment and labor necessary to control the flow, drainage and accumulation of water, and prevent soil erosion, blowing soil and accumulation of wind-deposited material on the site throughout duration of work. Insure that all excess water will run off the grades or will percolate within twelve (12) hours.
 7. Soil Testing: Soil Amendments, Soil Conditioners and Fertilizers shall meet the minimum amounts as specified in Article 3.3, "Installation", below. Unless determined by the Project Manager the Contractor shall be responsible for performing horticultural soil tests on a minimum of four (4) current soil samples for each source of topsoil to be used in the project. Reference Division 32 Section "Topsoil", Article 1.4, "Quality Control" for soil analysis report information. Soil test will be used to determine the type and amount of Soil Amendment, Soil Conditioner, and Fertilizer to be applied prior to seeding, sodding and planting. Locations for testing shall be approved by the Project Manager.
 8. Timing: Perform soil preparation just prior to planting operations and in accordance with final planting schedule. Coordinate with irrigation system installation to avoid damage.
- C. Areas of Compacted Topsoil: Areas within the work limits or as defined on Contract Drawings or by the Project Manager that have vegetation that is sparse, stunted, anemic, weedy or was used as a construction staging, parking area and/or subjected to heavy use will require ripping to prepare the soil for revegetation. Scarify compacted soil to a 8-inch depth minimum to loosen topsoil.
- D. Areas of Disturbed Topsoil: Areas disturbed but not severely compacted as determined by the Parks Project Manager, shall be deep tine aerated or shattered to prepare the soil for revegetation.
- E. Areas of Undisturbed Natural Topsoil: Undisturbed sites that are or were supporting healthy plant growth need only surface seedbed preparation prior to sowing seed.
- 3.3 INSTALLATION
- A. Install topsoil as required in Division 31 section "Earth Moving" and Division 32 Section "Topsoil".

B. Soil Preparation in Turf Grass Areas:

1. Apply Soil Amendments at the following rates:
 - a. Soil Amendments: Bid quantity to be four (4) cubic yards per one thousand (1,000) square feet, or per soil test recommendations.
 - b. Soil Conditioners: Apply per manufactures recommendations for the type of planting area, or per soil test recommendations.
 - c. Fertilizer: Diamonium phosphate, Bid quantity to be two (2) pounds of nitrogen per one thousand (1,000) square feet. Apply per manufactures recommendations for the type of planting area, or per soil test recommendations.
 - d. Mycorrhizal inoculants: Apply per manufacturer's instructions and quantities appropriate to the planting type.
2. After applying Soil Amendments, thoroughly till area to depth of six inches (6") minimum by plowing, rototilling, harrowing, or disking until soil is well pulverized and thoroughly mixed. Soil Conditioners and Fertilizer shall be applied topically once final grade has been established and just prior to sodding or seeding.

C. Fine Grading in all Landscape Areas:

1. Complete fine grading for all areas prior to seeding or planting. Allow for natural settlement.
2. For ground surface areas surrounding buildings to be landscaped, maintain required positive drainage away from buildings.
3. Establish finish grades to within plus or minus one tenth (0.10') foot of grades indicated, in order to prevent "bird-baths" or ponding.
4. Finish grade shall be below edge of pavement prior to sodding, seeding or planting.
 - a. Sodded Areas: Allow one and one half inches (1-1/2") for sod.
 - b. Seeding Areas: Allow one inch (1") for seed.
5. Noxious weeds or parts thereof shall not be present in the surface grade prior to seeding.
6. Compaction of Surface Grade Prior to Landscape Installation: Firm, but not hard, eighty five percent (85%) standard Proctor density within two percent (2%) optimum moisture.
7. Hand Raking:
 - a. Turfgrass Lawn Areas: Prior to acceptance of grades, hand rake to smooth, even surface, free of debris, clods, rocks and organic matter greater than one inch(1").
8. Restore planting areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.

3.4 CLEANING

- A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.
- B. Remove debris and excess materials from site. Clean out drainage inlet structures. Clean paved and finished surfaces soiled as a result of work under this Section, in accordance with Section 208 of the General Specifications or as directed by the Project Manager.

3.5 PROTECTION

- A. Provide and install barriers as required and as directed by Project Manager to protect completed areas against damage from pedestrian and vehicular traffic until acceptance by City.
- B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Vehicle traffic.
 - 4. Foot traffic.
 - 5. Erection of sheds or structures.
 - 6. Impoundment of water.
 - 7. Excavation or other digging unless otherwise indicated.
- C. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Project Manager and replace contaminated planting soil with new planting soil.

END OF SECTION 32 91 13

- 3) Spare Control Wires – Red.
 - 4) Spare Common Wires – Purple.
 - 5) Master Valve Wires – Green and Blue.
 - 6) Tracer Wire – Yellow.
 - d. Spare Wire and wire ends shall be capped with 3M DBR/Y-6Y or DBR direct bury splice, or similar UL listed dry splice methods to prevent wire corrosion.
2. Splice Box: Carson Brooks 10-inch round box, branded “SB.”
 3. Mainline Tracer Wire: Install one continuous AWG UL No. 10 (#10) tracer wire as detailed above all mainline. Loop wire into each valve cluster valve, gate valve and drain valve control boxes. Color shall be yellow.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Utility Locates: Contact Utility Notification Center of Colorado at or 8-1-1 or 1-800-922-1987 prior to any excavation, for the marking of underground member utilities. The indication of utilities on the Contract Drawings does not relieve the Contractor of the responsibility for utility location. Contractor is responsible for potholing all utility locations to verify the depth and locations. Potholing related to irrigation installation shall be considered incidental to irrigation installation and will not be paid for separately. Route trenches to avoid existing utilities. Verify with the Project Manager any required relocation prior to installation.
- B. Landscape Plan Review and Coordination: Contractor will be held responsible for coordination between landscape and irrigation system installation. Landscape material locations shown on the Landscape Plan shall take precedence over the irrigation system equipment locations. If irrigation equipment is installed in conflict with the landscape material locations shown on the landscape plan, the Contractor will be required to relocate the irrigation equipment, as necessary, at Contractor's expense.
- C. Pressure Verification: Contractor shall field verify the tap size, static pressure and verify Gallons Per Minute flow at the project site, prior to commencing Work or ordering irrigation materials, and submit findings in writing to the Project Manager. If Contractor fails to verify tap size, static water pressure and flow prior to commencing Work or ordering irrigation materials, Contractor shall assume responsibility for all costs required to make system operational and the costs required to replace any damaged landscape material. Damage shall include all required material costs, design costs, labor costs and plant replacement costs.
- D. Inspection: Examine areas and conditions under which Work of this Section is to be performed. Do not proceed with Work until unsatisfactory conditions have been corrected.
 1. Grading operations, with the exception of fine grading, shall be completed and approved by Project Manager before staking or installation of any irrigation system begins.
- E. Layout: Layout and stake system before beginning installation. Staking shall occur as follows:
 1. Mark, with paint, routing of pressure supply line and flag heads for all new zones. Contact the Project Manager forty eight (48) hours in advance and request review of staking. The Project Manager will review staking and direct changes if required. Review

does not relieve installer from coverage problems due to improper placement of heads after staking.

2. Valve boxes and mainline will not be located in ball fields, and multi-use sport fields, recovery zones, or below playground equipment.
3. If project has significant topography, free form planting beds, or other amenities which could require alteration of irrigation equipment layout as deemed necessary by the Project Manager, do not install irrigation equipment in these areas until the Project Manager has reviewed equipment staking.
4. The Project Manager may request the City Foresters approval of proposed trenching prior to start of trenching.
5. Review backflow prevention device location and operation with the Project Manager prior to mainline installation.

3.2 EXCAVATION AND BACKFILL

- A. Install mainline pipe and wire sleeving under existing asphalt paving, concrete walks and critical root zones by directional boring. Pot-hole existing utilities for location and depth in advance of boring operations. When pot-holing in cross streets: include all permits, traffic control, backfill, compaction and surface restoration as required by the City and County of Denver Transportation Engineering Standards and Specifications. Compact backfill at bore pits around the end of sleeves to ninety five percent (95%) compaction in landscape areas.
- B. Excavation:
 1. Trenching:
 - a. Trench excavation shall follow, as much as possible, the layout shown on Drawing. Dig trenches straight and support pipe continuously on bottom of trench. Trench bottom shall be clean and smooth with all rock and organic debris removed. Comply with OSHA standards for all trenching and excavation.
 - b. Trenching under limb spread of existing trees: Accomplish by hand or other method that will not damage limbs or branches. Refer to Division 01 "Tree Retention and Protection" for additional precautions.
 2. Clearances and Depths:
 - a. Main pressure line: Make trenches of sufficient width to properly assemble and position pipe in trench. Clearances:
 - 1) Piping three inches (3") and larger: Minimum clearance of piping three inches (3") or larger shall be five inches (5") horizontally on both sides of the trench.
 - 2) Piping two and one-half (2-1/2") and smaller: Trenches shall have a minimum width of four inches (4").
 - 3) Line Clearance: Provide minimum six inches (6") of clearance between each line, and minimum twelve inches (12") of clearance between lines of other trades.
 - 4) Lateral Pipe: Trenches shall have a minimum width of four inches (4").
 - 5) Line Clearance: Provide not less than six inches (6") of horizontal clearance between each line, and not less than twelve inches (12") of clearance between lines of other trades.
 - 6) Installation of multiple runs of piping in common trench is prohibited. .

EXHIBIT K

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Mundus Bishop

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- b. Pipe and Wire Depth to finish grade:
 - 1) Pressure Supply Piping within Parks: thirty inches (30") from the top of pipe, maximum variation two inches (2").
 - 2) Pressure Supply Piping within Right-of-Way: twenty four inches (24") from the top of pipe, maximum variation two inches (2").
 - 3) PVC Sleeving: At specified pipe or wire depth.
 - 4) Non-pressure Piping (gear driven heads): eighteen inches (18") from top of pipe, maximum variation two inches (2").
 - 5) Non-pressure Piping (pop-up heads): turf zones: eighteen inches (18") from top of pipe, native seed zones: twenty four inches (24") from top of pipe, maximum variation two inches (2").
 - 6) Control Wiring and Two-Wire Decoder Cable: Side of pressure main when installed in the same trench; twenty-four (24) inches from the top of wire bundle where installed separately from mainline trench.

- 3. Vibratory Plow: Not permitted without written authorization of the Project Manager.

3.3 INSTALLATION OF IRRIGATION EQUIPMENT

- A. Locate all equipment as near as possible to locations designated. Deviations shall be reviewed and approved by the Project Manager prior to installation.
- B. Sleeving:
 - 1. Install sleeving under any hard surface prior to surface being installed to accommodate piping and wiring.
 - 2. Minimum depth to top of pipe shall be determined by depth of mainline and lateral lines.
 - 3. Provide for a minimum cover of twenty four (24) inches between the top of the sleeve and the bottom of the aggregate base for all pressure and non-pressure piping installed under asphaltic concrete or concrete paving.
 - 4. Sleeving located under areas where asphalt or concrete paving will be installed shall be bedded with a sand layer six inches (6") below the pipe and six inches (6") above the pipe.
 - 5. Sleeving under existing walks or concrete pavement shall be done by jacking, boring or hydraulic driving. Where cutting of asphalt and/or concrete is necessary, it shall be done per the Contract Drawings and Details and or per the City and County of Denver Right of Way Standards. Where cutting of concrete is necessary remove the entire concrete section or "stone". Obtain permission to cut walks from the Project Manager.
 - 6. Compact backfill material in three uniform lifts at ninety five percent (95%) determined in accordance with ASTM D698 using mechanical tamping devices under pavement.
 - 7. Do not allow sleeves to become filled with soil or other undesirable material. Tape ends of sleeves until commencement of pipe installation.
 - 8. Mark sleeves on hard surfaces with a three inch (3") by three inch (3") "X" as per plans in a manner to ensure easy location in the future.
 - 9. Sleeve size requirements for wire and pipe, control wire shall be placed in sleeving separate from pipe sleeving:
 - a. 1" to 1-1/4" Pipe: 2" PVC (1)
 - b. 1-1/2" to 2" Pipe: 4" PVC (1)
 - c. 2-1/2" to 3" Pipe: 6" PVC (1)
 - d. 4" Pipe: 8" PVC (1)

SECTION 32 91 20**TOPSOIL****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes requirements for furnishing, stockpiling, and placing topsoil on a previously prepared subgrade.
- B. Related Sections:
 - 1. Division 01 Section "Erosion and Sedimentation Control".
 - 2. Division 31 Section "Earth Moving"
 - 3. Division 32 Section "Soil Preparation".
 - 4. Division 32 Section "Turfgrass Seeding".
 - 5. Division 32 Section "Sodding".
 - 6. Division 32 Section "Trees, Plants, and Groundcovers".

1.3 DEFINITIONS

- A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- B. Finish Grade: Elevation of finished surface of planting soil.
- C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- E. Planting Area: Areas to be planted.
- F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

- I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

- A. See Division 01 Section “Submittals” for submittal requirements.
- B. Soil Analysis Report: As indicated in Article 1.5 “Quality Control”, below.

1.5 QUALITY CONTROL

- A. Existing On-Site Topsoil:
 - 1. Submit soil analysis report for stockpiled on-site topsoil from the State University Agricultural Extension Service or other approved soil testing laboratory. Report shall cover soil textural classification (percentages of sand, silt, and clay), pH, percentage organic matter, and soluble salts (electric conductivity in millimos/centimeter), and shall include additive recommendations.
 - 2. A minimum of five (5) sample locations per acre are required, with individual tests completed for each sample.
 - 3. A map of the site illustrating the locations of each sample location is to be submitted to Project Manager for approval prior to collecting samples.
 - 4. Follow instructions from soil testing laboratory when collecting samples.
 - 5. Testing will be at the expense of the Contractor.
 - 6. Submit a one (1) quart sample along with analysis results.
- B. Imported Topsoil:
 - 1. Submit source location for topsoil to be imported to site for approval by Project Manager.
 - 2. Submit soil analysis report for topsoil imported to site, from the State University Agricultural Extension Service or other approved soil testing laboratory. Report shall cover soil textural classification (percentages of sand, silt, and clay), pH, percentage organic matter, and soluble salts (electric conductivity in millimos/centimeter), and shall include additive recommendations.
 - a. One 1-quart sample per five hundred (500) cubic yards of imported soil is required, with individual tests completed for each sample.
 - b. Follow instructions from soil testing laboratory when collecting samples.
 - 3. Testing will be at the expense of the Contractor.
 - 4. Submit a one (1) quart sample along with analysis results.
- C. Manufactured Topsoil:
 - 1. Submit source of manufactured topsoil to be imported to site for approval by Project Manager.
 - 2. Submit soil analysis report for stockpiled on-site topsoil from the State University Agricultural Extension Service or other approved soil testing laboratory. Report shall cover soil textural classification (percentages of sand, silt, and clay), pH, percentage organic matter, and soluble salts (electric conductivity in millimos/centimeter).
 - a. Test is to be completed within sixty (60) days preceding delivery to site. Report shall cover soil textural classification (percentages of sand, silt, and clay), pH, percentage organic matter, and soluble salts (electric conductivity in millimos/centimeter).

- b. Submit a one (1) quart sample along with analysis results.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver or place topsoil in a frozen, wet, or muddy condition.
- B. Protect stored and placed topsoil from vehicular traffic, equipment storage, material storage, or from contaminants or pollution sources. Topsoil that is compacted or tainted during construction is to be removed from site and disposed of at a licensed landfill at no additional cost to the City.

PART 2 - PRODUCTS

2.1 ON-SITE TOPSOIL

- A. Topsoil previously stripped and stockpiled prior to earthwork operations. See Division 31 Section "Earth Moving".

2.2 IMPORTED TOPSOIL

- A. All topsoil shall be a loam or sandy loam conforming to ASTM D 5268. At least ten (10) days prior to topsoil delivery, notify Project Manager of the source(s) from which topsoil is to be furnished. Topsoil shall be furnished by the Contractor and shall be a natural, friable soil representative of productive soils and shall meet the following conditions.
- B. It shall be obtained from the top six-inches (6") of well drained areas.
- C. Fertile, friable, loamy soil, reasonably free from subsoil, refuse, roots, heavy or stiff clay, stones larger than one-inch (1"), coarse sand, noxious seeds, sticks, brush, litter, and other deleterious substances; suitable for the germination of seeds and the support of vegetative growth. The pH value shall be between 6.5 and 7.5.
- D. Soil Texture:
 - 1. Sand: thirty percent (30%) – fifty percent (50%)
 - 2. Silt: thirty percent (30%) – fifty percent (50%)
 - 3. Clay: five percent (5%) – thirty percent (30%)
- E. Additives: As determined by soil fertility tests.
- F. Percent Organic Content:
 - 1. Turf grass shall be three percent (3%) maximum after amending or conditioning.
 - 2. Native grass shall be one percent (1%) maximum after amending or conditioning.
- G. Soluble Salts: Electric conductivity (EC) shall be less than two (2.0) mmhos/cm for turfgrass areas, dryland areas, and planting beds.

2.3 MANUFACTURED TOPSOIL

- A. "Amended Topsoil" as manufactured by A1 Organics, 16350 WCR 76, Eaton, CO 80615 Ph: (970) 454-3492, (800) 776-1644 Fax: (970) 454-3232 www.a1organics.com, or substitution as approved by Project Manager.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where the Work of this Section will be performed for compliance with requirements and conditions affecting installation and performance.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within the work area.
 - 2. Verify that final grades are completed in accordance with the Contract Drawings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected and approved by Project Manager.

3.2 PLACING TOPSOIL

- A. Scarify compacted subgrade to a six-inch (6") depth to bond topsoil to subsoil. Place topsoil to a minimum depth of six-inches (6") after settlement. Topsoil shall be free from weeds, sod, and material larger than 1-inch (1"), toxic substances, litter or other deleterious material. Spread evenly and grade to elevations and slopes shown on Contract Drawings. Hand rake areas inaccessible to machine grading.
- B. Utilize salvaged topsoil as the top layer to the extent available. If sufficient on-site material is not available, the Contractor shall furnish and install imported topsoil in the manner described above. Topsoil shall mixed thoroughly with the salvaged topsoil prior to placement.
- C. Utilize manufactured topsoil as the top layer, placing over scarified subgrade to a depth of six-inches (6").

3.3 PROTECTION AND REPAIR

- A. Protect completed areas where topsoil has been spread from traffic which will compact the soil volume. Any areas that, as determined by Project Manager, become compacted due to Contractor's construction traffic shall be reconstructed to specified requirements and approved by Project Manager.

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- e. 1 to 25 Control Wires: 2" PVC (1)
- f. 26 to 50 Control Wires: 3" PVC (1)
- g. Two-Wire Decoder Cable: 2" PVC (1)

C. Installation of Piping:

1. PVC Mainlines:

- a. Ensure that pipe is placed at a consistent depth and on a level base free of rocks and stones. Place manual drain valves at low points and dead ends of pressure supply piping to insure complete drainage of system. When pipe laying is not in progress, or at end of each day, close pipe ends with tight plug or cap. Perform Work in accordance with good practices prevailing in piping trades.
- b. Install Drain Valves at all low points of the system.
- c. Install mainlines a minimum of twenty four inches (24") off of any hard surface.
- d. Solvent Weld PVC Pipe (required on all pipes two and one-half inches (2-1/2") or less): Lay pipe and make all plastic to plastic joints in accordance with manufacturer's recommendations. Do not install pipe when air temperature is below forty degreeS (40°) F.
- e. Gasketed End Pipes (required on all pipes three inches (3") or larger): Lay pipe and make pipe-to-fitting or pipe-to-pipe joint, following the manufactures installation recommendations. Install joint restraint fittings and pipe restraints on all fittings and adjacent pipe runs per manufacturer's recommendations and per approved plan.

D. Thrust Blocks on all PVC mainline two and one-half-inches (2-1/2") and smaller: Construct thrust blocks per Contract Drawings and Details.

- 1. Concrete thrust blocks shall be a minimum of one (1) cubic foot of cast in place concrete in compliance with Division 03 Section "Cast-in-place Concrete". Contact the Project Manager prior to placing thrust blocks for observation of thrust block excavation and initial placement. Install a bond breaker made of a minimum six (6)-mil plastic between the thrust block and fittings being restrained. Size thrust blocks per soil type table below:

Soil Type	lbs./SF
Mulch, Peat, etc.	0
Soft Clay	500
Sand	1,000
Sand and Gravel	1,500
Sand and Gravel with Clay	2,000
Sand and Gravel Cemented with Clay	4,000
Hard Pan	5,000

E. Joint restraints on all gasketed PVC mainline pipe three inches (3") and larger: Install joint restraints per the plans and or manufactures recommendations.

- 1. Joint restraints shall be installed as shown on the plans or per the manufacturer's recommendations. Prior to backfilling any joint restraints the Project Manager shall be present to verify that the restraints were installed in the proper locations and that all bolts have been tightened to the manufactures specifications. Any restraints that are buried prior to inspection shall be excavated to allow for review and inspection at no additional cost to the City.

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- F. Flexible Plastic (Polyethylene) Pipe: Lay pipe and assemble fittings according to manufacturer's recommendations and per Contract Drawings and details.
- G. Control Wiring - Low Voltage Wiring:
 - 1. Bury control wiring between Automatic Irrigation Controller and electric valves in pressure supply line trenches, strung as close as possible to main pipe lines with such wires to be consistently located below and to one side of pipe, or in separate trenches.
 - a. Bundle all 24-volt wires at ten foot (10') intervals and lay with pressure supply line pipe to one side of the trench.
 - 2. Install tracer wire per Details.
 - 3. Provide an expansion loop at every mainline change of direction, every electric control valve location (in valve box), and every five hundred feet (500'). Form expansion loop by wrapping twenty four inches (24") of wire around a three quarters inch (3/4") pipe and withdrawing pipe.
 - 4. Make all splices and electric control valve connections using 3M DBR/Y-6 connectors
 - 5. Install all control wire splices not occurring at control valve in a separate Carson Industries Model #910-10 body with 910-4 bolt down T-cover wire splice valve box with branded with WS in 1-inch high letters minimum.
 - 6. Install one control wire for each control valve.
 - 7. Install a total of five spare #14 AWG UFUL control wires and one spare common wire from Automatic Irrigation Controller pedestal to the end of each and every leg of mainline. Label spare wires at Automatic Irrigation Controller and wire stub box.
- H. Installation of Valves:
 - 1. Electric Control Valves: Install electric control valves as detailed on the Contract Drawings.
 - a. Electric Control Valves for two-wire system: Install electric control valves as detailed on the Drawings. Install one valve decoder module (Toro ESB-BDC series) per valve box, sized to operate all valves located within same box.
 - 2. Valve Boxes: Install one valve box for each type of valve or manifold as detailed. Install compacted gravel leveling bed after compaction of subgrade and prior to setting of valve box.
 - a. Install filter fabric over gravel prior to setting valves boxes. Ensure that filter fabric extends a minimum of six inches (6") from the bottom and no more than 6" from the top of box. Secure the filter fabric to the side of box with grey tape.
 - b. Install valve boxes flush with finish grade and square to adjacent surface features and one another
 - c. When valve boxes are grouped together, allow at least twenty four inches (24") between valve box sides.
 - d. Install valve boxes a minimum of eighteen inches (18") off of any hard surface.
 - e. Cutting of valve box to give clearance for piping or valves is not allowed.

3.4 INSTALLATION OF SPRINKLER HEADS

- A. Install sprinkler heads where designated after the Project Manager has approved staking. Set to finish grade as detailed.

1. Spacing of heads shall not exceed the maximum indicated on Drawing(s) unless re-staked or as directed by the Project Manager. In no case shall the spacing exceed maximum recommended by manufacturer.
2. Install gear driven heads on swing-joint risers as detailed. Swing joints to non-pressure lines shall be set at no more than forty five degrees (45°) or less than ten degrees (10°).
3. Install pop-up heads on swing pipe as detailed.
4. Adjust part circle heads for proper coverage. Adjust heads to correct height after sod is installed. Plant placement shall not interfere with intended sprinkler head coverage, piping, or other equipment. The Project Manager may request nozzle changes or adjustments without additional cost to the City.

3.5 BACKFILLING

- A. Do not begin backfilling operations unless authorized by the Project Manager and all required systems tests have been completed. Backfilling shall not be done in freezing weather unless authorized by the Project Manager. Leave trenches slightly mounded to allow for settlement after backfilling is completed. Trenches shall be finish graded and sodded or seeded prior to walk-through of system by the Project Manager.
 1. Materials - Excavated material is generally considered satisfactory for backfill purposes. Backfill material shall be free of trash, organic matter, frozen materials, and stones larger than 2-inches in maximum dimension. Material not suitable for backfill shall be hauled away. Contractor shall be responsible for providing suitable backfill if excavated material is unacceptable or not sufficient to meet backfill, compaction, and final grade requirements.
 2. Do not leave trenches open for a period of more than forty eight (48) hours. Open excavations shall be protected in accordance with OSHA regulations.
 3. Compact backfill to ninety five percent (95%), determined in accordance with ASTM D698 utilizing the following methods in landscape areas:
 - a. Mainline Pipe: Backfill and mechanically compact in three uniform lifts to a ninety five percent (95%) compaction, utilizing optimum moisture content for the soil type. Hydraulic settling of mainline trenches will not be allowed.
 - b. Secondary Pipe: Backfill in two uniform lifts and hydraulically or mechanically compact each.
 - c. Puddling or ponding and/or jetting is prohibited within twenty feet (20') of building or foundation walls.

3.6 ADJUSTING

- A. Upon completion of installation, "fine-tune" entire system by regulating valves, adjusting arcs and radius, and setting pressure reducing valves at proper and similar pressure to provide optimum and efficient coverage. Flush and adjust all sprinkler heads for optimum performance and to prevent overspray onto walks, roadways, and buildings as much as possible. Heads of same type shall be operating at same pressure within plus or minus ten percent (10%).
- B. If it is determined by the Project Manager or Consultant that irrigation adjustments will provide improved coverage and water distribution, the Contractor shall make such adjustments prior to Final Acceptance. Adjustments may include but not limited to changes in nozzle sizes, degrees of arc, and control valve flow control regulations. Adjustments shall be completed at no additional costs to the City.

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- C. All sprinkler heads shall be set perpendicular to finish grade or within allowable limits shown on Contract Drawings.
- D. Areas that do not conform to designated operation requirements, due to unauthorized changes or poor installation practices, shall be immediately corrected at no additional cost to the City.

3.7 CLEANING

- A. Maintain continuous cleaning operation throughout duration of Work. Dispose of, all trash, waste materials, debris and excess soil generated by installation of irrigation system off-site at no additional cost to the City. Contractor shall clear all debris, including, soil, from all paths, walks, roads, and other hard surface areas.

END OF SECTION 32 80 00

SECTION 32 92 19**TURFGRASS SEEDING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes requirements for installation of turfgrass lawns, hydromulch, and maintenance of the seeded areas is achieved as outlined in Article 1.9.B, "Maintenance" until Final Acceptance.
- B. Related Sections:
 - 1. Division 01 Section "Erosion and Sedimentation Control".
 - 2. Division 32 Section "Irrigation System".
 - 3. Division 32 Section "Soil Preparation".
 - 4. Division 32 Section "Topsoil".
 - 5. Division 32 Section "Trees, Shrubs, and Groundcovers".

1.3 REFERENCES

- A. Comply with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act and be equal to or better in quality than the standards for Certified Seed.

1.4 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, Pesticides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- D. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- E. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.
- F. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

- G. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.
- H. Undesirable Plant Species including State designated Noxious Weeds as per the Colorado Noxious Weed Act (C.R.S. 35-5.5-101-119)

1.5 SUBMITTALS

- A. See Division 01 Section “Submittals” for submittal requirements.
- B. Product Data: For each type of product indicated.
 - 1. Pesticides: Include product label and manufacturer's application instructions specific to this Project.
- C. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
- D. Product Certificates: For soil amendments and fertilizers, from manufacturer.
- E. Material Test Reports:
 - 1. Soil analysis for each topsoil to be used.
 - 2. Analysis for manufactured topsoil.
 - 3. Analysis for each soil amendment.
 - 4. Analysis for each soil conditioner.
 - 5. Analysis for each amended planting soil.
 - 6. Analysis for native soils at the project site.
- F. Analysis and standards: Wherever applicable, for non-packaged materials, provide two copies of analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists.
- G. Planting schedule: Submit in writing two copies of proposed planting schedule, indicating dates for topsoil placing, site preparation, Pesticide treatments, soil preparation, sodding, seeding, and coordination with plant procurement, planting soil preparation, plant delivery and planting. Schedule all Work during specified planting seasons. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.
- H. Contract Closeout Submittals:
 - 1. Operating and Maintenance Data: At completion of work, submit 1 digital copy and 2 hard copies to the Project Manager in accordance with Division 01 Section “Contract Closeout”. Include directions for irrigation, aeration, mowing, fertilizing, and spraying as required for continued and proper maintenance through full growing season and dormant period.
 - 2. Warranty for Turfgrass Seed Areas: At completion of work, furnish written warranty to Project Manager based upon specified requirements.
- I. The Project Manager reserves the right to reject the seed at any time prior to acceptance and that fails to meet specification requirements. Promptly remove rejected seed from site.

1.6 QUALITY CONTROL

- A. Maintenance Qualifications: The maintenance contractor shall not be more than two hours normal travel time from the project site.
 - 1. Pesticide Applicator: State licensed, commercial.
 - a. Pesticide Applicator: Applicators shall be a Colorado State Licensed, Commercial Applicator.
- B. Soil Analysis: See Division 32 Section “Soil Preparation”.
- C. Standards: All materials and methods used during this portion of the work shall meet or exceed applicable federal, state, county, and local laws and regulations. All seed shall be free from insects and disease. Species shall be true to their scientific name as specified.
- D. Materials: The Contractor shall submit to the Project Manager for approval a complete list of all materials to be used during this portion of the work prior to delivery of any materials to the site. Include complete data on source, amount and quality. This submittal shall in no way be construed as permitting substitution for specific items described on the plans or in these specifications unless approved in writing by the Project Manager.
- E. Plant species substitutions shall be submitted to and approved by the Project Manager prior to construction.
- F. All grass species shall be supplied as pure live seed. Submit to the Project Manager lab germination test results for all grass species. Submit an affidavit that describes estimated purity for all forb species that are not typically tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Seed and other Packaged Materials: Deliver seed and packaged materials in original unopened containers bearing weight, certified analysis and name of supplier. Store in a manner to prevent the materials from becoming wet and deteriorating.
- B. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened container bearing manufacturer’s guaranteed chemical analysis, name, trade name, trademark and conformance to state law, and bearing name and warranty of producer.
- C. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.
 - 4. Seed: Deliver seed materials in original unopened containers, showing bearing weight, analysis and name of supplier. Store in a manner to prevent the materials from wetting and deterioration.
 - 5. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened container bearing manufacturer’s guaranteed chemical analysis, name, trade name, trademark and conformance to state law, and bearing name and warranty of producer.

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- D. Material will be inspected upon arrival at project site. Project Manager will reject any opened or unacceptable materials as described above.
- E. Immediately remove unacceptable material from job site.

1.8 PROJECT/SITE CONDITIONS

- A. Work scheduling: Proceed with and complete landscape work as rapidly as portions of the site become available, working within the specified planting season and approved schedule.
- B. Vehicular accessibility on site shall be as directed by Project Manager. Repair damage to prepared topsoil and existing surfaces, caused by vehicular access and movement during work under this section, to original condition at no additional cost to the City.
- C. Do not drill or sow seed during windy, rainy weather or when ground is frozen or otherwise unable to be tilled.
- D. Seeding Season: Seeding shall occur as specified below. The following are typical Colorado schedules. Modify the following for appropriate region. Verify with local producers and contractors prior to finalizing.

<u>Seed Type</u>	<u>Irrigated Areas Only</u>	<u>Non-irrigated Areas</u>
Bluegrass Lawn	April 15-Sept 1	N/A
Fescue Lawn	April 15-Sept 1	N/A

- E. Existing conditions:
 - 1. Existing Plants: Install sod only after all other landscape and irrigation items have been installed and accepted by the Project Manager.
 - 2. Utilities: Determine location of underground utilities. Perform work in a manner to avoid possible damage. Hand excavate, as required.
 - 3. Excavation: Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, noxious materials or obstructions, notify Project Manager before planting.
- F. Coordination:
 - 1. Coordinate with construction of utilities on site. Do not begin placing topsoil until underground work is completed in the area.
 - 2. Coordinate seeding with Contractor(s) approved schedule. Limit construction access to areas where topsoil has been placed and seeding will occur. Limit fine grading to areas that can be prepared for planting within twenty-four (24) hours after fine grading.
 - 3. No vehicular or equipment access shall be allowed within areas that have been seeded.
 - 4. Coordinate with installation of underground irrigation system.

1.9 MAINTENANCE

- A. General: The establishment period shall begin immediately after each area is seeded and continue until Final Acceptance of entire project. Final Acceptance of seeded areas will not be given until Project Manager is satisfied with germination and a full stand of grass, in a vigorous

growing condition, with consistent and complete coverage. During this time the contractor shall be responsible for Landscape Maintenance per Division 32 Section "Landscape Maintenance". Provide all supervision, labor, material and equipment to develop and maintain seeded areas. After Final Acceptance, maintenance shall become the responsibility of the City.

- B. The seeded areas shall be accepted on the basis of having a uniform plant growth over the entire seeded area. Two (2) months after seeding, the seeded areas shall be reviewed by the Project Manager and the Contractor. Any areas as determined by the Project Manager where the seed has failed to germinate shall be reseeded and raked to cover the seed. In any area where the seed has failed to grow, reseeding shall be at the Contractor's expense until grass is established and accepted. Acceptable uniform plant growth shall be defined as scattered bare spots, not greater than 1 square foot, and do not exceed two percent (2%) of the seeded area.
- C. Mowing and Trimming: When turfgrasses reach three and one half inches (3-1/2") in height, begin weekly mowing program to maintain turf at two and one half inches (2-1/2) to three inches (3") in height.
 - 1. Do not remove more than one third (1/3) the height of the grass leaf in single mowing.
 - 2. Do not mow when grass is wet.
 - 3. All clippings from adjacent paved areas shall be removed and clippings from mowed turf areas shall be removed at the direction of Project Manager and Parks Operations Supervisor.
- D. Fertilizing: Within sixty (60) days of seeding and every sixty (60) days thereafter until final acceptance, apply specified fertilizer to maintain optimal turf vigor or per the direction of the Project Manager.
- E. Weed Control: Control annual weeds by mowing. Do not use pesticides unless approved by the Project Manager and Parks Operations Supervisor.
- F. Insect and Disease Control: As needed, apply insecticide and fungicide approved by the Project Manager and the Parks Operations Supervisor.

1.10 WARRANTY

- A. Warranty for Seeded Turf Areas: Warrant areas in seed to be in a healthy, vigorous growing condition, and for consistency and completion of coverage for a period of one (1) year from date of Substantial Completion as a full stand of grass. After seed germination, re-seed any spots where seed has not germinated within the total seeded area. Continue this procedure until a successful stand of grass is growing and accepted by Project Manager.
- B. Reseeding will not be allowed in any season considerable unfavorable for seeding by the Project Manager.
- C. Reseed in a manner to achieve quality as originally specified.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil: See Division 32 Section "Topsoil".

- B. Soil Preparation: See Division 32 Section “Soil Preparation.
- C. Seed Mix:
1. Seed shall be fresh, clean and new crop mixture mixed by an approved method.
 2. Bluegrass Lawn Blend: Kentucky bluegrass minimum ninety percent (90%) and Perennial ryegrass maximum ten percent (10%):
 - a. Include at least four (4) improved Kentucky bluegrass cultivars, each of a different type classification. At least one cultivar shall be an aggressive type and one shall be shade tolerant. Submit list of proposed varieties to Project Manager a minimum of ten (10) days prior to seeding.
 - b. Application rate:
 - 1) Mechanical Seeding: Four (4) pounds pure live seed (PLS) per one-thousand (1,000) square feet.
 - 2) Hand Broadcast Seeding: Eight (8) pounds pure live seed (PLS) per one-thousand (1,000) square feet
 3. Fescue Lawn Blend: Slow-growing, fine fescue grasses minimum six species of fescue.
 - a. Provide Prairie Nursery No Mow Lawn or approved equal.
 - b. Application rate:
 - 1) Mechanical Seeding: Five (5) pounds pure live seed (PLS) per one-thousand (1,000) square feet.
 - 2) Hand Broadcast Seeding: Ten (10) pounds pure live seed (PLS) per one-thousand (1,000) square feet
 4. The formula used for determining the quantity of PLS shall be:

$$\text{Pounds of Seed} \times (\text{Purity} \times \text{Germination}) = \text{Pounds of PLS}.$$
 5. Mulch: Wood cellulose fiber suitable for hydromulching, in compliance with CDOT 213.02.
 6. Tackifier: In compliance with CDOT 213.
 7. Fertilizer: Inorganic mixture with following chemical composition: (20-5-10) with fifty percent (50%) sulfur coated urea (no iron), or as recommended by testing lab based on soil sample results.
 8. Water: Contractor to utilize the existing irrigation system and or quick coupler(s) when available. If irrigation or quick coupler(s) are not available then the contractor is responsible for watering. Refer to Division 31 Section “Watering”. Water shall be free of substances that may be harmful to seed growth. Hoses and other watering equipment necessary to water the seed to be furnished by Contractor.

2.2 PESTICIDES

- A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticide unless authorized in writing by Project Manager and authorities having jurisdiction.
1. Pre-Emergent Pesticide (Selective and Non-Selective): Use only with approval by Project Manager. Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
 2. Post-Emergent Pesticide: “Round-up” by Monsanto, or approved equal.

2.3 EROSION-CONTROL MATERIALS

- A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, six (6") inches long.
- B. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd., with fifty (50) to sixty-five (65) percent open area. Include manufacturer's recommended steel wire staples, six (6") inches long.
- C. Erosion-Control Mats: Cellular, non-biodegradable slope-stabilization mats designed to isolate and contain small areas of soil over steeply sloped surface, of three (3")-inch nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Invisible Structures, Inc.; Slopetame 2.
 - b. Presto Products Company, a business of Alcoa; Geoweb.
 - c. Tenax Corporation - USA; Tenweb.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
 - 1. Verify that finish grades are consistent with the slopes and grades indicated on the Contract Drawings. Verify grades are in conformance with Division 31 Section "Earth Moving".
 - 2. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within the work area.
 - 3. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
 - 4. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 5. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected and approved by the Project Manager.
- C. Acceptance: Beginning of installation means acceptance of existing conditions by the Contractor.

3.2 PROTECTION

- A. Protect existing utilities, paving and other facilities from damage caused by seeding operations. Contractor shall repair any damage at no additional cost to the City.
- B. Restrict vehicular and pedestrian traffic from seeded areas until grass is established. Erect signs and barriers as required or directed by the Project Manager at no additional cost to the City.

- C. Locate, protect and maintain the irrigation system during seeding operations. Irrigation system components damaged during seeding operations shall be replaced or repaired to current City irrigation standards at Contractor's expense.
- D. Erosion Control: Take measures and furnish equipment and labor necessary to control and prevent soil erosion, blowing soil and accumulation of wind-deposited materials on the site throughout the duration of work.

3.3 PREPARATION

- A. Work notification: Notify the Project Manager at least seven (7) working days prior to start of seeding operations.
- B. Utilize equipment having low unit pressure ground contact within planting areas.
- C. Limit preparation to areas that can be seeded within twenty-four (24) hours of preparation.
- D. The Contractor shall prepare the soil of all areas to be seeded in accordance with the requirements of Division 32 Section "Soil Preparation".
- E. Weed Control: See Division 32 Section "Soil Preparation" for required weed control procedures. Do not proceed with planting until Project Manager has approved the specified and completed weed control measures.
- F. Fine Grading: See Division 32 Section "Soil Preparation". Maintain positive drainage, prevent ponding and direct run-off into catch basins, drainage structures, etc., and provide well-contoured surface prior to proceeding. A firm weed-free seed bed is required. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations. Obtain Project Manager's approval of finished grade prior to proceeding with seeding operations.
 - 1. Protect adjacent and adjoining areas from hydromulching overspray.
 - 2. Protect grade stakes set by others until directed to remove them.
- G. When completed, the soil shall be firmed by float dragging, followed by steel raking, to provide for the proper seeded surface. The seed bed shall be totally free from rock or clay clods or any materials over one (1") inch in diameter.

3.4 TURF AREA PREPARATION

- A. Limit turf subgrade preparation to areas that can be seeded within twenty-four (24) hours.
- B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of six (6") inches. Remove material larger than one (1") inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off site.
- C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
 - 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 - 2. Loosen surface soil to a depth of at least eight (8") inches. Apply per Division 32 Section "Soil Preparation".
 - 3. Remove material larger than one (1") inch in any dimension.

4. Legally dispose of waste material, including grass, vegetation, and turf, off site.

- D. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- E. Verify that all areas are graded to drain at a minimum of two percent (2%) or as indicated on the Contract Drawings. Verify that subsurface drainage system and drain inlets, if present, are operative.
- F. Verify that irrigation system is operable and provides adequate coverage prior to planting.

3.5 PREPARATION FOR EROSION-CONTROL MATERIALS

- A. Prepare area as specified in Article "3.4 Turf Area Preparation" above.
- B. Review erosion control measures with Project Manager prior to installation.
- C. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.
- D. Fill cells of erosion-control mat with planting soil and compact before planting.
- E. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.
- F. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.6 INSTALLATION

- A. Seed within twenty four (24) hours after preparation of bed.
- B. Seasonal Restrictions: See article 1.8 above.
- C. Areas outside Contract Limits disturbed as a result of construction operations shall be seeded at Contractor's expense.
- D. Seed shall be uniformly applied at the specified rate with a mechanical seeder, (half in one direction and the other half at right angles to the first application). The direction of the final application shall always be at right angle to the slope or running in the direction of the contour. Seed shall be installed at a depth between one-quarter (1/4") inch and one-half (1/2") inch.
- E. Areas that are too small or steep for mechanical seeding may be hand seeded. Seed shall be uniformly applied at the specified rate utilizing a broadcast spreader and then hand rake to a depth of no more than one-half (1/2") inch, then roll seed bed to ensure proper contact to the soil.

3.7 MULCHING

- A. Mulch: Wood cellulose fiber suitable for hydromulching, in compliance with CDOT 213.02.

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- B. Tackifier: In compliance with CDOT 213.
- C. Contractor shall provide verification of application rates in the form of ship tickets.
- D. Mulching shall not be installed when surface water is present resulting from rains, melting snow irrigation or other causes.
- E. Areas not properly mulched, or any damage that may occur during construction is the responsibility of the Contractor and shall be repaired and re-mulched in an acceptable manner at the Contractor's expense. Mulching removed by wind, rain or other causes prior to acceptance shall be re-established by the Contractor at his own expense.
- F. The seeded area shall be mulched within eight (8) hours of seeding. Areas not mulched within eight (8) hours after seeding must be re-prepped and re-seeded with the specified seed mix at the Contractor's expense.
- G. Contractor shall remove all hydromulch from and surface area not specified for seeding, including but not limited to plant materials, fences, paved areas, signs, mulch beds, irrigation components and all other objects as directed by the Project Manager.

3.8 TURF MAINTENANCE

- A. Mowing and Trimming: When turfgrasses reach three and one-half inches (3-1/2") in height, begin weekly mowing program to maintain turf at two and one-half inches (2-1/2") to three inches (3") inches in height.
 - 1. Do not remove more than one third (1/3) the height of the grass leaf in single mowing.
 - 2. Do not mow when grass is wet.
 - 3. All clippings from adjacent paved areas shall be removed and clippings from mowed turf areas shall be removed at the direction of Project Manager and Parks Operations Supervisor.
- B. Fertilizing: Within sixty (60) days of seeding and every sixty (60) days thereafter until final acceptance, apply specified fertilizer to maintain optimal turf vigor or per the direction of the Project Manager.
- C. Weed Control: Control annual weeds by mowing. Do not use pesticides unless approved by the Project Manager and Parks Operations Supervisor.

3.9 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Project Manager
 - 1. The seeded areas shall be accepted on the basis of having a uniform plant growth over the entire seeded area.
 - 2. Two (2) months after seeding, the seeded areas shall be reviewed by the Project Manager and the Contractor.
 - 3. Any areas as determined by the Project Manager where the seed has failed to germinate shall be reseeded and raked to cover the seed.
 - 4. In any area where the seed has failed to grow, reseeding shall be at the Contractor's expense until grass is established and accepted.
 - 5. Acceptable uniform plant growth shall be defined as scattered bare spots, not greater than one (1) square foot, and do not exceed two percent (2%) of the seeded area.

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- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.10 PROTECTION

- A. Protect existing utilities, paving and other facilities from damage caused by seeding operations, Contractor shall repair any damage at no additional cost to the City.
- B. Restrict vehicular and pedestrian traffic from seeded areas until grass is established. Erect signs and barriers as required or directed by the Project Manager at no additional cost to the City.
- C. Locate, protect and maintain the irrigation system during seeding operations. Repair irrigation system components damaged during seeding operations shall be replaced or repaired to current City irrigation standards at Contractor's expense.
- D. Erosion Control: Take measures and furnish equipment and labor necessary to control and prevent soil erosion, blowing soil and accumulation of wind-deposited materials on the site throughout the duration of work.

3.11 CLEANING

- A. Perform cleaning during installation of the work and upon completion of the work to the satisfaction of the Project Manager. Remove from all excess materials, debris and equipment from site. Repair any damage resulting from seeding operations.

END OF SECTION 32 92 19

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SECTION 32 92 23

SODDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes requirements for furnishing and installation of bluegrass sod, and maintenance of sodded areas as outlined in Maintenance Section 1.8.B. until Final Acceptance.
- B. Related Sections:
 - 1. Division 01 Section "Erosion and Sedimentation Control".
 - 2. Division 31 Section "Earth Moving".
 - 3. Division 32 Section "Irrigation System".
 - 4. Division 32 Section "Soil Preparation".
 - 5. Division 32 Section "Topsoil".
 - 6. Division 32 Section "Trees, Plants, and Groundcovers".

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, pesticides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, herbicide, defoliant, or desiccant.
- C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- D. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- E. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.
- F. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- G. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

- H. Weeds: Including but not limited to Goathead, Bindweed, Twitch, Dandelion, Jimsonweed, Knapweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Weed, Bent Grass, Wild Garlic, Perennial Sorrel, and Broom Grass.

1.4 SUBMITTALS

- A. See Division 01 Section “Submittals” for submittal requirements.
- B. Product Data: For each type of product indicated.
1. Pesticides: Include product label and manufacturer's application instructions specific to this Project.
- C. Sod Certificates:
1. State, Federal and other inspection certificates for sod shall be provided to the Project Manager a minimum of 10 working days prior to anticipated date of sod delivery.
 2. Submit a list of varieties contained in the sod, and include the source and origin for approval by the Project Manager.
- D. Qualification Data: For qualified landscape Installer.
- E. Product Certificates: For soil amendments and fertilizers, from manufacturer.
- F. Material Test Reports: For existing-in-place surface soil.
1. Soil analysis for each topsoil to be used.
 2. Analysis for manufactured topsoil.
 3. Analysis for each soil amendment.
 4. Analysis for each amended planting soil.
- G. Analysis and standards: Wherever applicable, for non-packaged materials, provide two copies of analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists.
- H. Planting schedule: Submit in writing two copies of proposed planting schedule, indicating dates for topsoil placing, site preparation, pesticide treatments, soil preparation, sodding, seeding, and coordination with plant procurement, planting soil preparation, plant delivery and planting. Schedule all Work during specified planting seasons. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.
- I. Maintenance Instructions: Recommended procedures for maintenance of turf and dryland grasses during a calendar year. Submit before expiration of required initial maintenance periods.
- J. Contract Closeout Submittals:
1. Operating and Maintenance Data: At completion of work, submit one digital copy and two hard copies to the Project Manager in accordance with Division 01 Section “Contract Closeout”. Include directions for irrigation, aeration, mowing, fertilizing and spraying as required for continued and proper maintenance through full growing season and dormant period.

2. Warranty for Turfgrass Sod Areas: At completion of work, furnish written warranty to Project Manager based upon specified requirements.

- K. The Project Manager reserves the right to reject the sod at any time prior to acceptance and that fails to meet specification requirements.

1.5 QUALITY CONTROL

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf and dryland grass establishment.
 1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
 2. Experience: Five years' experience in turf installation in addition to requirements in Division 01 Section "Quality Control."
 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 4. Sod Producer: Company specializing in sod production and harvesting with minimum five (5) years' experience, and certified by the State of Colorado Department of Agriculture.
 5. Personnel Certifications: Installers shall have certification the following categories from the Professional Landcare Network:
 - a. Certified Landscape Technician - Exterior, with installation maintenance irrigation specialty area(s), designated CLT-Exterior.
 6. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
 7. Pesticide Applicator: State licensed, commercial.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Soil Analysis: See Division 32 Section "Soil Preparation".
- D. Preinstallation Conference: Conduct conference at Project site to coordinate the process with other trades, to coordinate equipment movement within planting areas and to avoid soil compaction, to review proposed methods of installation, performance criteria, and maintenance procedures. Review underground utility location maps and plans. This meeting shall be coordinated by the Contractor, and comply with requirements in Division 1.
- E. Standards: All materials and methods used during this portion of the work shall meet or exceed applicable federal, state, county, and local laws and regulations. All sod shall be free from insects and disease. Species shall be true to their scientific name as specified.
- F. Materials: The Contractor shall submit to the Project Manager for approval a complete list of all materials to be used during this portion of the work prior to delivery of any materials to the site. Include complete data on source, amount and quality. This submittal shall in no way be construed as permitting substitution for specific items described on the plans or in these specifications unless approved in writing by the Project Manager.
- G. Source Quality Control:

1. Sod Materials: Subject to inspection and acceptance. The Project Manager reserves the right to reject at any time or place prior to acceptance, any work and sod which in the Project Manager's opinion fails to meet these specification requirements.
2. Inspection will be made periodically during sodding, at completion and at end of warranty period by the Project Manager. Primarily for quality; however, other requirements are not waived even though visual inspection results in acceptance.
3. Promptly remove rejected sod from site.

H. Sod Standards:

1. Sod shall consist of healthy, thick turf having undergone a program of regular fertilization, mowing and weed control; free of weeds; uniform in green color, leaf texture and density; healthy, vigorous root system; inspected and found free of disease, nematodes, pests and pest larvae by the State Department of Agriculture.
2. Each piece of Sod shall consist of a sandy-loam soil base that will not break, crumble or tear during sod installation.
3. Sod thickness shall be a minimum three quarters inch (3/4") thick, excluding top growth and thatch.
4. Thatch layer shall not exceed one half inch (1/2"), uncompressed.
5. Sod shall be delivered and installed within twenty four (24) hours of being cut.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver on pallets properly loaded on vehicles with root system protected from exposure to sun, wind, and heat in accordance with standard practice. Sod that has been damaged by poor handling or improper storage is subject to rejection by the Project Manager.
1. Protect from dehydration, contamination, freezing and heating at all times. Keep stored sod moist and under shade or covered with moistened burlap.
 2. Do not drop sod rolls from carts, trucks or pallets.
 3. Do not deliver more sod than can be installed within twenty four (24) hours.
- B. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened container bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark, warranty and conformance to state law.
- C. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 3. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.
 4. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened container bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark and conformance to state law, and bearing name and warranty of producer.
- D. Material will be inspected upon arrival at project site. Project Manager will reject any opened or unacceptable materials as described above.

- E. Immediately remove unacceptable material from job site.

1.7 PROJECT/SITE CONDITIONS

- A. Work scheduling: Proceed with and complete landscape work as rapidly as portions of the site become available, working within the specified planting season and approved schedule.
- B. Vehicular accessibility on site shall be as directed by Project Manager. Repair damage to prepared topsoil and existing surfaces, caused by vehicular access and movement during work under this section, to original condition at no additional cost to the City.
- C. Install sod between April 15 and October 1 or when irrigation is available for twenty one (21) days per Denver Water's guidelines for sod establishment.
- D. Schedule work for periods of favorable weather. Do not install sod on saturated or frozen soil. The Project Manager reserves the right to deny sod installation on days that are deemed to be unfavorable for installation.
- E. Existing conditions:
 - 1. Existing Plants: Install sod only after all other landscape and irrigation items have been installed and accepted by the Project Manager.
 - 2. Utilities: Determine location of underground utilities. Perform work in a manner to avoid possible damage. Hand excavate, as required.
 - 3. Excavation: Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, noxious materials or obstructions, notify Project Manager before planting.
 - 4. If weeds are present on site, treat with pesticide prior to preparing soil for installing sod as specified in this or other Sections.
- F. Coordination:
 - 1. Coordinate with construction of utilities on site. Do not begin placing topsoil and sod until underground work is completed in the area.
 - 2. Coordinate sodding with Contractor(s) approved schedule. Limit construction access to areas where topsoil has been placed if placement is completed more than 3 days prior to commencement of landscaping in the area. Limit fine grading to areas that can be prepared for planting within twenty four (24) hours after fine grading.
 - 3. Coordinate with Contractors work requiring access to site over sodded areas.
 - 4. Coordinate with installation of underground irrigation system.

1.8 WARRANTY

- A. Warranty for Sod Areas: Warrant areas in sod to be in a healthy, vigorous growing condition, and for consistency and completion of coverage for a period of one year from date of Substantial Completion as a full stand of grass. Re-sod any spots larger than 12" square where sod has failed to establish, as defined in this Section. Continue this procedure until a successful stand of grass is growing and accepted by the Project Manager.
 - 1. During the original warranty period, re-sod at once with comparable blend/mix, those areas that have failed to achieve a stand of grass or which in the Project Manager's opinion are unhealthy.

2. Re-sodding will not be allowed in any season considerable unfavorable for sodding by the Project Manager.
- B. Re-sod in a manner to achieve quality as originally specified per the Project Manager's direction

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil: See Division 32 Section "Topsoil".
- B. Soil Preparation: See Division 32 Section "Soil Preparation.
- C. Sod:
 1. Colorado grown Kentucky Bluegrass blend having a healthy, vigorous root system. Blend shall contain a minimum of three (3) improved varieties, of which at least one variety is an aggressive type.
 2. Sod to be produced in accordance with requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding."
 3. Harvesting: Sod shall be fertilized 2–3 weeks prior to harvesting. Mow sod to a height of one and one-half inches (1-1/2") before the sod is lifted. Sod shall be harvested in rolls, and shall not be cut more than 24 hours prior to planting.
 4. Size: Machine cut to a minimum pad thickness of three quarters inch (3/4), excluding top growth and thatch. Provide sod of uniform pad sizes eighteen inches (18") maximum width by twenty four (24") minimum length, with maximum five percent (5%) deviation in either length or width. Broken pads or pads with uneven ends will not be acceptable. Sod pads incapable of supporting their own weight when suspended vertically from upper ten percent (10%) of pad will be rejected. Sod which has dried out, sod with adhering soil which breaks, tears, or crumbles away will not be accepted. Sod cut for more than twenty-four (24) hours will not be accepted.
 5. Plastic netting: Sod to be free of plastic netting used during establishment by sod grower.
- D. Fertilizer: Inorganic mixture with following chemical composition: (20-5-10) with fifty percent (50%) sulfur coated urea (no iron), or as recommended by testing lab based on soil sample results.
- E. Water: Contractor to utilize the existing irrigation system and or quick coupler(s) when available. If irrigation or quick coupler(s) are not available then the contractor is responsible for watering. Refer to Division 31 Section "Watering". Water shall be free of substances that may be harmful to sod growth. Hoses and other watering equipment necessary to water the sod to be furnished by Contractor.

2.2 PESTICIDES

- A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as

required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by Project Manager and authorities having jurisdiction.

1. Pre-Emergent Pesticide (Selective and Non-Selective): Use only with approval by Project Manager. Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
2. Post-Emergent Pesticide "Round-up" by Monsanto, or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
 1. Verify that finish grades are consistent with the slopes and grades indicated on the Contract Drawings. Verify grades are in conformance with Division 31 Section "Earth Moving".
 2. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 3. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
 4. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 5. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected and approved by the Project Manager.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Engineer and replace with new planting soil.
- D. Acceptance: Beginning of installation means acceptance of existing conditions by the Contractor.

3.2 PREPARATION

- A. Work notification: Notify the Project Manager at least seven (7) working days prior to start of sodding operations.
- B. Limit turf subgrade preparation to areas that can be sodded within twenty four (24) hours.
- C. Newly Graded Subgrades: Prepare soil as required by Division 32 Section "Soil Preparation".
- D. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.

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2. Loosen surface soil to a depth of at least 8 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top six inches (6") of soil. Till soil to a homogeneous mixture of fine texture.
 3. Remove stones larger than one-half (1/2") inch in any dimension and sticks, roots, trash, and other extraneous matter.
 4. Legally dispose of waste material, including grass, vegetation, and turf, off City property.
- E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Verify that all areas are graded to drain at a minimum of two percent (2%) or as indicated on the Contract Drawings. Verify that subsurface drainage system and drain inlets if any, are operative.
- G. Verify that irrigation system is operable and provides adequate coverage prior to planting.
- H. Adjustment: Adjust irrigation heads to proper watering height according to depth of sod material but lower than compacted blade height to enable lawn mowers to cut grass freely without damage to the sprinkler system.
- I. When completed, the soil shall be firmed by float dragging, followed by steel raking, to provide for the proper sodded subgrade. The sod bed shall be totally free from rock or clay clods over one-half inch (1/2") inch in diameter.
- J. Repair: Re-establish grade and specified conditions to damaged sod areas prior to placing sod.

3.3 INSTALLATION

- A. Sodding:
1. Sod within twenty-four (24) hours after preparation of bed.
 2. If plastic netting is present within sod, remove all netting during sod installation and discard from site.
 3. Subgrade on which sod is laid shall be slightly moist during installation.
 4. Lay sod with longest dimension parallel to contours and in continuous rows.
 5. Tightly butt ends and sides of sod together. Stagger and compact vertical joints between sod strips.
 6. Sod shall not be overlapped or stretched during placement. Exposed joints due to shrinkage will require replacement of sod in affected areas.
- B. Topsoil: Where new sod abuts an existing turf area topsoil shall be placed along seams and or joints to provide a smooth transition.
- C. Rolling: Sod shall be rolled after installation to ensure proper contact with the subgrade, and to ensure tight joints between adjacent pieces. Sod shall be moist prior to rolling. Once rolling is complete additional watering shall occur. Roller shall weigh one-hundred (100) pounds.
- D. Drainage: Contractor shall ensure that finished areas are graded so that positive drainage of storm and irrigation water is achieved.
- E. Water thoroughly with a fine spray as laying progresses and immediately after planting. Saturate sod with fine water spray within two hours of planting. During first week after

planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (1-1/2 ") below sod.

- F. After sod and soil have dried, roll sodded areas to ensure a good bond between sod and soil and to remove minor depressions and irregularities. Roller shall not exceed one hundred (100) pounds.

3.4 FERTILIZING

- A. Distribute (20-5-10) fertilizer uniformly at the rate of five (5) pounds of material per one-thousand (1,000) square feet, one (1) pound of actual nitrogen per thousand (1,000) square feet or sixty (60) days after initial sodding operations and every sixty (60) days thereafter until Final Acceptance of project by the Project Manager.

3.5 PROTECTION

- A. Protect existing utilities, paving and other facilities from damage caused by sodding operations, Contractor shall repair any damage at no additional cost to the City.
- B. Restrict vehicular and pedestrian traffic from sodded areas until grass is established. Erect signs and barriers as required or directed by the Project Manager at no additional cost to the City.
- C. Locate, protect and maintain the irrigation system during sodding operations. Repair irrigation system components damaged during sodding operations shall be replaced or repaired to current City irrigation standards at Contractor's expense.
- D. Erosion Control: Take measures and furnish equipment and labor necessary to control and prevent soil erosion, blowing soil and accumulation of wind-deposited materials on the site throughout the duration of work.

3.6 MAINTENANCE

- A. General: The maintenance period shall begin immediately after each area is sodded and continue until Final Acceptance of entire project. Final Acceptance of sodded areas will not be given until Project Manager is satisfied with establishment and a full stand of grass, in a vigorous growing condition, and thoroughly rooted to the soil and absence of visible joints. During this time, the Contractor is responsible for watering, mowing, spraying, weeding, fertilizing and all related work as necessary to ensure that sodded areas are in a vigorous growing condition. Provide all supervision, labor, material and equipment to develop and maintain sodded areas from time of installation, then for a period of two (2) years from Substantial Completion. After Final Acceptance, maintenance shall become the responsibility of the City.
- B. The sodded areas shall be accepted on the basis of having a healthy, uniform stand of turf over the entire sodded area. Forty five (45) days after sodding, the sodded areas shall be reviewed by the Project Manager and the Contractor. Any areas as determined by the Project Manager where the sod has failed to establish shall be re-sodded. Acceptable sod establishment shall be defined healthy uniform turf that does not contain any stressed or bare spots greater than one square foot.

- C. Mowing and Trimming: When turfgrasses reach three and one-half inches (3-1/2") in height, begin weekly mowing program to maintain turf at two and one-half inches (2-1/2") to three inches (3") in height. Do not remove more than 1/3 the height of the grass blade in single mowing. Do not mow when grass is wet. All clippings from adjacent paved areas shall be removed and clippings from mowed turf areas shall be removed to the satisfaction of Project Manager.
- D. Fertilizing: Within thirty (30) days of sodding and every sixty (60) days thereafter until Final Acceptance, apply specified fertilizer to maintain optimal turf vigor or per the direction of the Project Manager.
- E. Weed Control: Control annual weeds by mowing. Do not use pesticides unless approved by the Project Manager and Denver Parks Operations Supervisor.
- F. Insect and Disease Control: As needed, apply insecticide and fungicide approved by the Project Manager and the Parks Operations Supervisor.

3.7 CLEANING

- A. General: Provide and install barriers as required and as directed by Project Manager to protect sodded areas against damage from pedestrian and vehicular traffic until Final Acceptance.

END OF SECTION 32 92 23

SECTION 32 93 00

TREES, PLANTS, AND GROUNDCOVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes requirements for furnishing, installing, and maintaining live woody plant material.
- B. Related Sections:
 - 1. Division 01 Section "Tree Retention and Protection".
 - 2. Division 31 Section "Earth Moving"
 - 3. Division 32 Section "Irrigation System".
 - 4. Division 32 Section "Soil Preparation".
 - 5. Division 32 Section "Topsoil".

1.3 DEFINITIONS

- A. ANSI: American National Standards Institute. Z60.1 is the national standard for nursery stock.
- B. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- C. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than the minimum root spread according to ANSI Z60.1 for type and size of plant required.
- E. Diameter at Breast Height (DBH): Defined as the diameter at four and one-half inches (4 ½") above the soil line.
- F. Caliper: Trunk diameter is measured six-inches (6") from the ground; if the caliper is greater than four-inches (4"), the measurement is taken at twelve-inches (12") from the ground.
- G. Cane: A cane shall be considered a primary stem which starts from the ground or at a point close to the ground at a point not higher than one-fourth (1/4) the height of the plant, and which reaches the minimum height stated in the plant size specification.
- H. Central leader: Also referred to as leader or the dominant leader. A continuation of the main trunk located more or less in the center of the crown, beginning at the lowest main scaffold branch and extending to the top of the tree.

EXHIBIT K

- I. Circling root(s): One or more roots whose diameter is greater than ten percent (10%) of the trunk caliper circling more than one-third of the trunk. Circling roots are unacceptable.
- J. Clear Trunk: The portion of the trunk below the main crown which may include shortened temporary branches.
- K. Co-dominant: Two or more vigorous, upright branches or stems of relatively equal diameter that originate from a common point, usually where the leader was lost or removed. Co-dominant stems are unacceptable.
- L. Container-Grown: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
- M. Crown: The portion of a tree beginning at the lowest main scaffold branch extending to the top of the tree. On younger trees, the crown may be comprised of temporary branches.
- N. Cultivar: A named plant selection from which identical or nearly identical plants can be produced, usually by vegetative propagation or cloning.
- O. Drip Zone: The outermost edge of the tree's canopy or branch spread. The area within a tree's drip line is all the ground under the total branch spread.
- P. Finish Grade: Elevation of finished surface of planting soil.
- Q. Included Bark: Bark embedded in the union between a branch and the trunk or between two or more stems that prevents the formation of a normal branch bark ridge. Included bark is unacceptable.
- R. Kinked Root: A main root that is sharply bent. Kinked roots are unacceptable.
- S. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.
- T. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- U. Root Collar: Also referred to as the root flare. The base of a tree where the main roots and trunk meet.
- V. Scaffold Branches: Large main branches that form the main structure of the crown.
- W. Stem-girdling Root: A circling, bent, or straight root that touches or rests on the trunk or root flare that can become a permanent root. Stem-girdling roots are unacceptable.
- X. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

- Y. Temporary Branch: A small branch that is temporarily retained along the lower trunk of young trees.
- Z. Tree Protection Zone: The zone equal to eighteen inches (18") radially from the tree for every one-inch (1") of trunk diameter at breast height.
- AA. Trunk: The main stem of a tree, beginning at the root collar and ending at the lowest main scaffold branch.
- BB. Taper: The thickening of a trunk or branch toward its base.

1.4 SUBMITTALS

- A. See Division 01 Section "Submittals" for submittal requirements.
- B. Product Data: For each type of product.
 - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
- C. Product Samples: At a minimum provide the following samples for approval by the Project Manager, additional product samples may be required at the direction of the Project Manager.
 - 1. Mulch: one (1) gallon bag minimum of each type of mulch.
 - 2. Tree Stakes: one (1) of each type.
 - 3. Tree Straps: one (1) each.
 - 4. Guy Material: one (1) linear foot.
 - 5. Guy Signal: one (1) linear foot.
 - 6. Tree Wrap: one (1) linear foot.
- D. Pesticides: Product label, Safety Data Sheet (SDS) labels and manufacturer's application instructions specific to Project.
- E. Proper Identification: All plants shall be true to name as ordered or shown on planting plans and shall be labeled individually or in groups by species and cultivar (as appropriate).
- F. Contractor shall provide a complete list of all plant material for approval by the Project Manager a minimum of ten (10) days prior to delivery. Any substitutions of plant material, including but not limited to size, type, species and variety shall be listed and submitted to the Project Manager for approval.
- G. Contractor shall provide the following certificates:
 - 1. State Inspection Certificate from the origin nursery.
 - 2. Certificate from origin state.
 - 3. Quarantine Certificate from origin state.
 - 4. Any Certificates required by the USDA Animal and Plant Health Inspection Service (APHIS) and ANSI-Z-160 and accompanying Rules and Regulations.
- H. Analysis of existing soil shall be per Division 32 Sections "Topsoil" and "Soil Preparation".
- I. Contract Close Out Submittals:
 - 1. Operating and Maintenance Data: At completion of work, submit One (1) digital copy and two (2) hard copies to the Project Manager in accordance with Division 01 Section

“Contract Closeout”. Include recommended procedures for continued and proper maintenance during a full calendar year.

2. Warranty for Trees, Plants, and Groundcovers: At completion of work, furnish written warranty to the Project Manager based upon specified requirements.

1.5 QUALITY CONTROL

- A. The Project Manager reserves the right to reject, at any time or place prior to final acceptance, all plant materials that fail to meet these specifications in the Project Manager’s opinion. Inspection of materials is primarily for quality, size, and variety, but other requirements are not waived even though visual inspection results in approval. Plants are to be inspected where available; however, inspection at the places of supply shall not preclude the right of rejection at the site or at a later time prior to Final Acceptance. Rejected material shall be removed from the site within twenty-four (24) hours.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Materials: Deliver materials in original containers with tags showing genus, species and size. Protect materials from damage during delivery and while stored at site. The Project Manager reserves the right to inspect containers before or after installation to verify compliance with Specifications.
- B. Bulk Materials:
 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants or in tree protection zones.
 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 3. Accompany each delivery of bulk materials with appropriate certificates.
- C. Trees: Nursery stock shall be harvested and planted during the same growing season. Do not prune, except as approved by the City Forester and the Project Manager. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or tie trees in such a manner as to destroy natural shape. Provide protective covering during delivery. Plant materials delivered without protective covering may be rejected. Do not drop trees during delivery. All trees shall be labeled with a securely attached waterproof tag bearing a legible plant name. Remove all tags and flagging as directed by the Project Manager.
- D. Deliver bare-root stock plants within twenty-four (24) hours of digging. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting. Transport in covered, temperature-controlled vehicles, and keep plants cool and protected from sun and wind at all times.
- E. Store bulbs, corms, and tubers in a dry place at sixty degrees to sixty-five degrees (60° to 65°) F until planting.
- F. Handle planting stock by the root ball only.

- G. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
 - 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again (2) two weeks after planting.
- H. Deliver trees after preparations for planting have been completed and install immediately. If planting is delayed more than six (6) hours after delivery, set planting materials in shade, protect from weather and mechanical damage, and keep roots moist.
 - 1. Set balled stock on ground and cover ball with wood chips, or other acceptable material.
 - 2. Do not remove container-grown stock from containers before planting.
 - 3. Water root systems of trees stored on site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

1.7 PROJECT/SITE CONDITIONS

- A. Field measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Vehicular accessibility on site shall be as directed by the Project Manager. Repair damage to prepared topsoil and existing surfaces, caused by vehicular access and movement during work under this section, to original condition at no additional cost to the City.
- C. Utilities: Contractor shall be responsible locating utilities and, repair of utilities damaged during the work. Determine location of overhead and underground utilities and perform work in a manner that will avoid damage. Hand excavate, as required. Maintain markings until their removal is mutually agreed upon by the Contractor and Project Manager.
- D. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the Project Manager before planting.
- E. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.
- F. Protection: Erect and maintain barricades, warning signs and lights, and provide guards as necessary or required to protect all persons on the site from exposed excavations.

1.8 COORDINATION AND SCHEDULING

- A. Coordinate installation of planting materials during normal planting seasons for each type of plant material required. Planting materials should be planted between April 15 and October 1, or at the direction of the Project Manager.
- B. Plant trees after final grades have been accepted and prior to seeding or sodding, unless otherwise authorized by the Project Manager.

1.9 WARRANTY

- A. Warranty: The warranty specified in this Article shall not deprive the City of other rights the City may have under other provisions of the Contract Documents and shall be in addition to, and run concurrently with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Trees, Plants, and Groundcovers shall be warranted for a period of one (1) year after date of Substantial Completion, against defects including death, structural failures, dieback as determined by the City Forester and the Project Manager. Warranty shall not cover defects resulting from lack of adequate maintenance, neglect or abuse by City staff, hail, or incidents that are beyond Contractor's control.
- C. The Warranty shall not be enforced should any plant die due to vandalism after Substantial Completion.
- D. Remedial Actions:
 - 1. Replace any plant materials that have been excessively pruned, more than twenty percent (20%) percent dead, or in an unhealthy or declining condition immediately upon notice from the Project Manager during warranty period.
 - 2. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
- E. All plants shall be true to name and meet all conditions of these specifications. Any plant that is not true to name as indicated by form, leaf, flower, or fruiting characteristics shall be replaced at the Contractor's expense.

1.10 TREE MAINTENANCE DURING CONSTRUCTION PERIOD

- A. Maintain trees by pruning, cultivating, watering, mulching, winter watering, weeding, wrapping, unwrapping, restoring planting saucers, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Control as required to keep trees free of insects and disease. Restore or replace damaged tree wrappings, stakes, guying. Trees shall be maintained by the Contractor through the Warranty period of the project.

PART 2 - PRODUCTS

2.1 PLANT MATERIALS

- A. General: Furnish and install nursery-grown trees and shrubs conforming to the requirements of ANSI-Z-160, with healthy root systems developed by transplanting or root pruning. Provide well shaped, symmetrical, fully branched, healthy, and vigorous stock free of disease, insects, eggs, larvae, girdling, and defects such as sun scald, injuries, abrasions, and disfigurement. Trees of a larger size than that specified in the plant list may be used with a proportionate increase in size of roots and balls, if acceptable to the Project Manager. The use of larger plants shall be covered by the Contractor at no additional cost to the City.
- B. Label all plants of each size, caliper and variety and caliper with a securely attached waterproof tag bearing legible designation of botanical and common name.

- C. All plants shall be the genus, species, and variety designated on the Contract Drawings. No substitutions will be accepted without the prior written approval of the City Forester and the Project Manager. Contractor must provide proof of non-availability.

2.2 TREES

- A. These specifications shall apply to deciduous, broadleaf evergreen and coniferous species. Note that leaf characteristics will not be evident on deciduous trees during the dormant season.
- B. Crown: The form and density of the crown shall be typical for a young specimen of the species/cultivar. Changes in form caused by wind, pruning practices, pests, or other factors shall not substantially alter the form for the species/cultivar. These crown specifications do not apply to plants that have been specifically trained in the nursery to be: topiary, espalier, multi-stem, or clump; or unique selections such as contorted or weeping cultivars.
 - 1. Trees shall have a single, relatively straight trunk, and central leader, unless noted on plans to be "Multi-trunk" or "Clump". They shall be free of co-dominant stems and vigorous, upright branches that compete with the central leader. If the original leader has been headed, a new leader at least one-half of the diameter of the original leader shall be present.
 - 2. Main branches shall be evenly distributed along the central leader, not clustered together. They shall form a balanced crown appropriate for the age of the species/cultivar.
 - 3. Branch diameter shall be no larger than one-half the diameter of the central leader measured one-inch (1") above where the branch is attached.
 - 4. The attachment of the largest scaffold branches shall be free of included bark.
 - 5. Temporary branches, unless otherwise specified, should be present along the lower trunk below the lowest scaffold branch, particularly for trees less than one-inch (1") in caliper. These branches should be no greater than three-eighths-inch (3/8") diameter. Clear trunk shall be no more than thirty percent (30%) of the total height of the tree, unless otherwise noted
- C. Trunk: The tree trunk shall be relatively straight, vertical, and free of wounds, except properly made pruning cuts, which shall be closed over or less than three-quarters-inch (3/4") diameter open, sunburned areas, conks (fungal fruiting bodies), wood cracks, bleeding areas, signs of boring insects, galls, cankers, stem-girdling ties, or lesions (mechanical injury).
 - 1. Trunk caliper and taper shall be sufficient so that the tree will remain vertical without a stake. Trunk caliper at six-inches (6") above the soil media (substrate) surface shall be within the diameter range shown for each container size below and as specified in current edition of ANSI Z60.1.
 - 2. The cut made when re-growing the top should be just above the major structural roots. The "shank" that results from this procedure should be at a consistent height above the structural roots and no longer than five-inches (5"), to ensure that the trees are consistently planted at the correct depth. The base of the trunk should not have a large pruning cut from re-growing the top.
- D. Roots: The root system shall be substantially free of injury from biotic (e. g., insects and pathogens) and abiotic (e. g., pesticide toxicity and salt injury) agents.
 - 1. The uppermost roots or root collar shall be within the upper two-inches (2") of the soil media (substrate). Depth of the root-ball shall be measured from the top of the ball, which in all cases shall begin at the root flare. Soil above the root flare shall not be included in the root-ball depth measurement, and shall be removed.

2. The root collar and the inside portion of the root-ball shall be free of defects, including circling, kinked, and stem-girdling roots. Soil removal or root washing near the root collar may be necessary to inspect for the aforementioned root defects.
 3. Roots on the periphery and bottom of the root-ball shall be less than one-eighth-inch (1/8") diameter.
 4. The tree shall be well rooted in the soil media (substrate). Root distribution shall be uniform throughout the soil or media. Structure and growth shall be appropriate for the species/cultivar. When the burlap or container is removed, the root-ball shall remain intact. Trees should have several lateral roots or many fibrous roots spaced evenly around the trunk to provide support so the trees are stable when planted. Trees should have as many small roots as possible. These roots are key to the uptake of sufficient water and nutrients. Fibrous roots can be achieved by root-pruning, using air-pruning containers, or under-cutting or root pruning and transplanting at any stage of production.
 5. As a general rule for young nursery-grown trees, there should be two or more structural roots within one- to three-inches (1" – 3") of the soil surface. "First order lateral roots" is another term that has been used for these roots. If the roots are deeper than three-inches (3") , the stock shall be rejected.
 6. Root-balls that are undersized as specified in current edition of ANSI Z60.1. shall be rejected. Field grown trees for balled and burlap delivery shall have the roots pruned at least six-inches (6") inside the final root-ball size performed within adequate time for the tree to develop fibrous roots at the outer edge of the root-ball prior to harvest and delivery.
- E. Leaves: The size, color, and appearance of leaves shall be typical for the time of year and stage of growth of the species or cultivar. Trees shall not show signs of prolonged moisture stress or extended drought as indicated by wilted, shriveled, or dead leaves.
- F. Branches: Shoot growth (length and diameter) throughout the crown shall be appropriate for the age and size of the species/cultivar. Trees shall not have dead, diseased, broken, distorted, or otherwise injured branches.
- G. All deciduous trees of one species used in formal rows or groupings shall exhibit cultural uniformity, i.e. "matched" in height, crown width and shape, height to first branch, and trunk taper. For this reason, it is desired that these trees be produced by a single grower.
- H. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated, and only if approved by the City Forester and the Project Manager.

2.3 SHRUBS

- A. Container Grown Shrubs: All specifications for container grown plants shall include both plant size and container size. Plant size intervals and reference to height or spread shall be in accordance with the guidelines for the appropriate plant type set forth in ANSI Z60.1; Section 2.2 - Types of Deciduous Shrubs.
- B. Container size shall be by container classification (i.e., not by container volume) as set forth in the ANSI Z60.1 Container Class Table.
- C. In all cases, container grown nursery stock shall meet the following general requirement:

EXHIBIT K

1. All container grown nursery stock shall be healthy, vigorous, well rooted, and established in the container in which it is growing. Container grown nursery stock shall have a well-established root system reaching the sides of the container to maintain a firm ball when the container is removed, but shall not have excessive root growth encircling the inside of the container.
- D. The container shall be sufficiently rigid to hold the ball shape and to protect the root mass during shipping.
- E. Minimum shrub sizes shall conform to the following standards:
 1. Tender shrubs (Type 0) that do not produce top growth that is winter hardy:

Height or Spread	Minimum number of canes	Minimum spread of roots
fifteen-inches (15")	three (3) canes	Nine-inches (9")

2. Small shrubs (Type 1) that grow to a mature height of not more than three feet (3'):

Height or Spread	Minimum number of canes	Minimum spread of roots
fifteen-inches (15")	four (4) canes	Nine-inches (9")

3. Intermediate shrubs (Type 2) that grow to a mature height between three feet (3') and seven feet (7'):

Height or Spread	Minimum number of canes	Minimum spread of roots
Two feet (2')	four (4) canes	twelve-inches (12")

4. Large shrubs (Type 3) that grow to a mature height exceeding seven feet (7'):

Height or Spread	Minimum number of canes	Minimum spread of roots
four feet (4')	six canes (6)	twenty-inches (20")

2.4 PERENNIALS, GRASSES, GROUNDCOVERS, AND VINES

- A. All container grown plants shall be healthy, vigorous, well rooted, and established in the container in which they are growing, and be in conformance with ANSI Z60.1. A container grown plant shall have a well-established root system reaching the sides of the container to maintain a firm root ball, but shall not have excessive root growth encircling the inside of the container. Top growth is to be in conformance with established nursery standards.

2.5 TREE-STABILIZATION MATERIALS

- A. Trunk-Stabilization Materials:
 1. Deciduous Tree Stakes: Rough-sawn, sound, new softwood with specified wood preservative treatment by pressure process, free of knots, holes, cross grain, and other defects, two-inch (2") diameter by six feet (6'), pointed at one end.
 2. Evergreen Tree Stakes: Two foot (2') steel T-posts; green color.
 3. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, #14 galvanized-steel wire, two-strand, twisted.
 4. Tree-Tie Webbing: UV-resistant nylon webbing with brass grommets, size as indicated.

5. Safety Signals for Guy and Staking Wire: One-half inch (1/2") diameter PVC pipe, length as indicated.

B. Tree-Wrap:

1. Two layers of crinkled paper cemented together with bituminous material, four-inches (4") wide minimum, with stretch factor of thirty-three percent (33%).
2. Tree wrap tape: Tape as approved by the City Forester and the Project Manager.

2.6 PLANT PIT BACKFILL MATERIAL

- A. Unless otherwise directed by the Project Manager, the plant pit backfill material shall consist of the following, thoroughly mixed:
1. Soil originally excavated from the pit: two thirds (2/3) proportion of total mix.
 2. Soil Amendment as specified in Division 32 Section "Soil Preparation"; one-third (1/3) proportion of total mix.
- B. If imported topsoil is required, it shall meet the requirements specified in Division 32 Section "Topsoil", Article 2.2.

2.7 MULCH

- A. Organic Mulch: Organic mulch, free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of chipped wood material not larger than four-inches (4") in length. Mulch is to be weed-free.

2.8 MISCELLANEOUS MATERIALS

- A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees, as approved by the City Forester and the Project Manager. Deliver in original, sealed, and fully labeled containers. Mix and apply according to manufacturer's instructions.
- B. Pre-Emergent Pesticide: As approved by the City Forester and the Project Manager.
- C. Pesticides: EPA registered and approved, and as approved by the City Forester and the Project Manager.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify actual grade elevations and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Examine areas to receive landscaping for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.
1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within the work area.

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2. Verify that adequate overhead clearance exists to planting locations.
 3. Suspend planting operations during periods of excessive moisture until acceptable planting conditions exist.
 4. Uniformly moisten excessively dry soil that is not workable.
- C. If contamination is present in the soil within planting area, notify Project Manager immediately.
1. If contamination is discovered during Construction the Project Manager will determine the best course of action to remediate the contamination, which may include requesting the Contractor perform the removal of contamination and replacement of clean material.
 2. If contamination is determined to be the result of construction operations, Contractor is to remove contaminated material and replace with clean material at the direction of the Project Manager.
- D. Proceed with installation only after unsatisfactory conditions have been corrected and approved by the Project Manager.
- E. Cooperate with any other contractors and trades, who may be working in and adjacent to the landscape work areas. Examine the Contract Drawings which show the development of the entire site and become familiar with the scope of all work required.
- 3.2 FINISH GRADING
- A. See Division 31, Sections “Earth Moving” and 32 Sections “Soil Preparation” and “Topsoil”.
- 3.3 PREPARATION
- A. Protect structures, utilities, sidewalks, pavements, and other facilities, turf areas and existing plants from damage caused by planting operations. Repair damage to surrounding areas and site elements noted above resulting from planting operations at no additional cost to the City.
- B. Utilities: Contractor shall be responsible locating utilities and, repair of utilities damaged during the work. Determine location of overhead and underground utilities and perform work in a manner that will avoid damage. Hand excavate, as required. Maintain markings until their removal is mutually agreed upon by the Contractor and the Project Manager.
- C. Layout, stake and label all individual tree locations for approval by the Project Manager prior to installing trees.
- D. Outline planting beds and mark plant locations within the bed(s) for approval by the Project Manager prior to installing any plant material or mow bands. Make adjustments as directed by the Project Manager at no additional cost to the City.
1. If formal arrangements or consecutive order of plants is indicated on Contract Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.
- E. Prepare planting area for soil placement and mix planting soil according to Division 32 Section “Soil Preparation”.

3.4 WEED CONTROL

- A. Do not proceed with landscape work until weed growth has been controlled and eliminated, per Division 32 Section "Soil Preparation".
- B. See Division 32 Section "Soil Preparation" for detailed weed control measures.
- C. Use pesticides only with the written approval of the Project Manager, and in strict accordance with manufacturer's instructions.

3.5 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits: Excavate by hand or with a backhoe. Scarify sides of tree pit. Tree spade may not be used to dig tree pits.
 - 1. Balled and Burlapped Trees: Excavate a minimum two times (2X) as wide as ball diameter at base of pit. The base of the root collar shall be three-inches (3") higher than the grade at which the tree originally grew and finished grade. Slope sides of the pit as shown on the detail.
 - 2. Container-Grown Trees and Shrubs: Excavate approximately two times (2X) times as wide as container diameter. Plants shall be set one-inch (1") higher than finished grade.
 - 3. Do not excavate deeper than depth of the root ball, measured from the base of the root flare to the bottom of the root ball.
 - 4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly compact the added soil to prevent settling.
- B. Obstructions:
 - 1. Utilities: Notify the Project Manager immediately of utilities that conflict or may potentially conflict with proposed plant locations. In such cases, alternative plant locations will be determined by the Project Manager.
 - 2. Notify the Project Manager prior to planting if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavation.
- C. Drainage: Notify the Project Manager if subsoil conditions show evidence of water seepage or retention in tree or shrub pits.
 - 1. Fill the pit with water and allow it to completely drain before planting occurs.
 - 2. If water does not drain out of pit within twenty-four (24) hours, notify the Project Manager.

3.6 PLANTING TREES AND SHRUBS

- A. Balled and Burlapped Stock:
 - 1. Set balled and burlapped stock plumb and in center of pit with base of root flare three-inches (3") above adjacent finish grades as indicated.
 - 2. Remove burlap from top two-thirds (2/3) of balls and partially from sides, but do not remove from under balls. Remove wire baskets and all twine entirely. Remove pallets, if any, before setting. Do not use planting stock if ball is cracked or broken before or during planting operation.
 - 3. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing

remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.

B. Container Grown Stock:

1. Carefully remove containers so as not to damage root balls.
2. Lightly scratch sides of exposed root ball to loosen surface roots.
3. Set plants plumb and in center of pit with top of ball raised one-inch (1") above adjacent finish grades or as indicated.
4. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly, then place remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.

C. Bare-Root Stock: Set and support each plant in center of planting pit or trench with root flare two-inches (2") above adjacent finish grade.

1. Backfill: As specified in Part 2 of this Section.
2. Spread roots laterally without tangling or turning toward surface. Plumb before backfilling, and maintain plumb while working.
3. Carefully work backfill in layers around roots by hand eliminating air pockets. Bring roots into close contact with the soil.
4. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

3.7 TREE WRAP

A. Inspect tree trunks for injury, improper pruning, and insect infestation and take corrective measures required before wrapping. Wrap trees starting at the base of the trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling. Use black electrical tape to secure. Do not use staples.

1. All deciduous trees shall be wrapped by November 1st or per the direction of the City Forester and the Project Manager. All tree wrap shall be removed by May 15.
2. Contractor shall be responsible for wrapping and unwrapping trees during the warranty period.

3.8 PRUNING OF PLANTS

A. Prune only damaged or dead branches as directed by the City Forester and the Project Manager.

3.9 TREE STABILIZATION

A. Install site-fabricated trunk stabilization as follows, unless otherwise indicated on Contract Drawings.

1. Drive stakes into undisturbed grade outside tree pit. Avoid penetrating root balls or root masses.
2. Securely attach specified wire to stakes.
3. Support trees with specified wire and tree tie webbing from the tree trunk to each stake. Allow enough slack to avoid rigid restraint of the tree.
4. For guyed trees: Attach thirty-six inch (36") long by one-half inch (1/2") diameter PVC pipe flagging to each wire.

5. For staked trees: Attach twenty-four inch (24") long by one-half inch (1/2") diameter PVC pipe flagging to each wire.

3.10 MULCHING

- A. Trees: Create a forty-eight-inch (48") diameter formed soil berm around tree and fill with three-inch (3") deep specified wood mulch. Mulch shall be kept four to six-inches (4"-6") away from tree trunk.
- B. Shrubs:
 1. Mulch backfilled surfaces of pits, planting beds areas, and other areas indicated or as directed by the Project Manager.
 2. Mulch in shrub bed areas: Apply three-inch (3") thick layer of mulch and finish level with adjacent finish grades. Do not place mulch against stems of plants.

3.11 ANTIDESICCANT

- A. Apply antidesiccant using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage.
- B. When deciduous plants are moved in full-leaf, the Project Manager may direct the use of an antidesiccant at nursery before moving and again two (2) weeks after planting. Antidesiccant to be supplied and applied by Contractor at no additional cost to the City.

3.12 CLEANING

- A. Perform cleaning during installation of the work and upon completion of the Work, to the satisfaction of the Project Manager. Remove all excess materials, debris, and equipment from site. Repair any damage resulting from planting operations.
- B. Remove surplus soil, excess subsoil, unsuitable soil, and waste material including trash and debris generated during installation at no additional cost to the City.

3.13 PROTECTION

- A. Protect existing utilities, paving and other facilities from damage caused by planting operations. The Contractor shall repair any damage at no additional cost to the City.
- B. Restrict vehicular and pedestrian traffic from planted areas. Erect signs and barriers as required or directed by the Project Manager at no additional cost to the City.
- C. Erosion Control: Take measures and furnish equipment and labor necessary to control and prevent soil erosion, blowing soil and accumulation of wind-deposited materials on the site throughout the duration of work.

3.14 MAINTENANCE

- A. The Contractor shall be responsible for maintaining all trees, shrubs, and groundcover until substantial completion is issued.

EXHIBIT K

Sullivan Gateway
Mundus Bishop

Trees, Plants, and Groundcovers
32 93 00 - 15

- B. Maintain trees by pruning, cultivating, watering, mulching, winter watering, weeding, wrapping, unwrapping, restoring planting saucers, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Control as required to keep trees free of insects and disease. Restore or replace damaged tree wrappings, stakes, guying.
- C. During the irrigation season (generally May through September), water may be available from on-site quick couplers. When the system is not charged, it shall be the Contractor's responsibility to supply adequate amounts of water from a water truck or other approved source. Hoses and other watering equipment shall be supplied by Contractor.
 - 1. Watering Amount: Ten (10) gallons per caliper-inch.
- D. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

END OF SECTION 32 93 00

EXHIBIT K

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EXHIBIT K

Appendix

Mortar Evaluation Sullivan Gates, Atkinson-Noland & Associates, August 23, 2017

EXHIBIT K

Mortar Evaluation

Sullivan Gates

Prepared by:

Atkinson-Noland & Associates, Inc.
2619 Spruce Street
Boulder, CO 80302
(303) 444-3620

ANA Job No. 17-149

Prepared for:

Building Restoration Specialties
3060 Walnut Street
Denver, Colorado 80205

(303) 297-2004

August 23, 2017



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Introduction

One mortar sample was removed by Building Restoration Specialties (BRS) from the Pioneer Women statues at the Sullivan Gates in Denver, Colorado and tested in the Atkinson-Noland & Associates (ANA) laboratory for mortar composition. Characteristic mortar properties were identified through a series of chemical tests. The objective was to identify binder types and proportions, binder/aggregate ratio, aggregate color, and aggregate size to provide an appropriate compatible replacement mortar formulation. The sample was provided by BRS to the ANA laboratory in Boulder, Colorado for analysis.

Analysis Techniques

Two analysis techniques were used. The chemical mortar examination followed the method described in *Chemical Characterization of Historic Mortars* by Middendorf, et al¹. This method is based on the use of acid digestion and chemical analysis to identify soluble silica resulting from portland cement hydration. Additionally, aggregate sieve analysis followed the requirements of ASTM C136, *Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates*. This method is based on the use of acid digestion of the binder and sieve analysis of the aggregate.

The sample identification list is shown in Table 1.

Table 1. Sample identification and location

Sample ID	Location
S1	Sullivan Gates Statue

Analysis Results

The results of the chemical analysis and acid digestion of the sample are shown in Table 2 and Table 3, respectively. The binder component was found to be approximately 44%, and the aggregate component was found to be approximately 56%. Based on the ratio of portland cement to lime from the analysis, the original mortar is closest to a Type O mortar. Sample S1 exhibits a binder/aggregate ratio that would be considered under-sanded in comparison with typical modern mortar standards. That is, the mortar has a high binder content in comparison with the sand content.

The aggregate gradation curve, plotted in Figure 1, shows that the aggregate from S1 generally falls outside the gradation range of coarse and fine aggregates as specified by ASTM C144, *Standard Specification for Aggregate for Masonry Mortars*. The aggregates are somewhat finer than the finest aggregate gradation allowed by ASTM C144, however we recommend using masonry sand conforming to ASTM C144.

¹ Middendorf, et al. *Chemical Characterization of Historic Mortars. State-of-the-Art Report of RILEM Technical Committee 167-COM: Characterization of Old Mortars with Respect to their Repair*. RILEM Publications SARL, 2004.

EXHIBIT K

The aggregate size distribution and colors are shown in Figure 2. Ideally, the aggregate for the replacement mortar should match the color of the existing aggregates. Trial mixtures may be required to produce a repair material that matches the original with respect to color and texture.

Recommended Mortar Formulation

Mortar used for repointing joints, crack repair, and rebuilding should meet requirements of ASTM C270, *Standard Specification for Mortar for Unit Masonry*, for Type O mortar, with volumetric proportions of 1 part portland cement, 2 parts lime, and 8 to 9 parts sand.

The use of pigments may be required to match the hardened mortar color. Pigments conforming to ASTM C979, *Standard Specification for Pigments for Integrally Colored Concrete*, are suitable for mortar, but should not exceed 5% by weight of binder content in the mortar. It is also possible that the use of white portland cement will be required in lieu of typical gray cement in order to match the existing mortar color. Trial mixtures may be required to arrive at a mix that matches the original mortar with respect to color and texture.

Table 2. Results of chemical mortar analysis

Sample ID	Sample Mass (g)	Aggregate Mass (g)	Soluble Silica (g)	Volumetric Ratio		
				Portland Cement	Lime	Aggregate
S1	10.00	6.97	0.31	1	2	5

Table 3. Results of acid digestion of concrete samples

Sample ID	Mass before acid digestion (g)	Mass after acid digestion (g)	Binder mass (g)	Aggregate mass (g)	Binder volume (cm ³)	Aggregate volume (cm ³)	Total volume (cm ³)	Binder (%)	Aggregate (%)
S1	74.29	53.08	21.21	53.08	33.10	41.42	74.52	44	56

EXHIBIT K

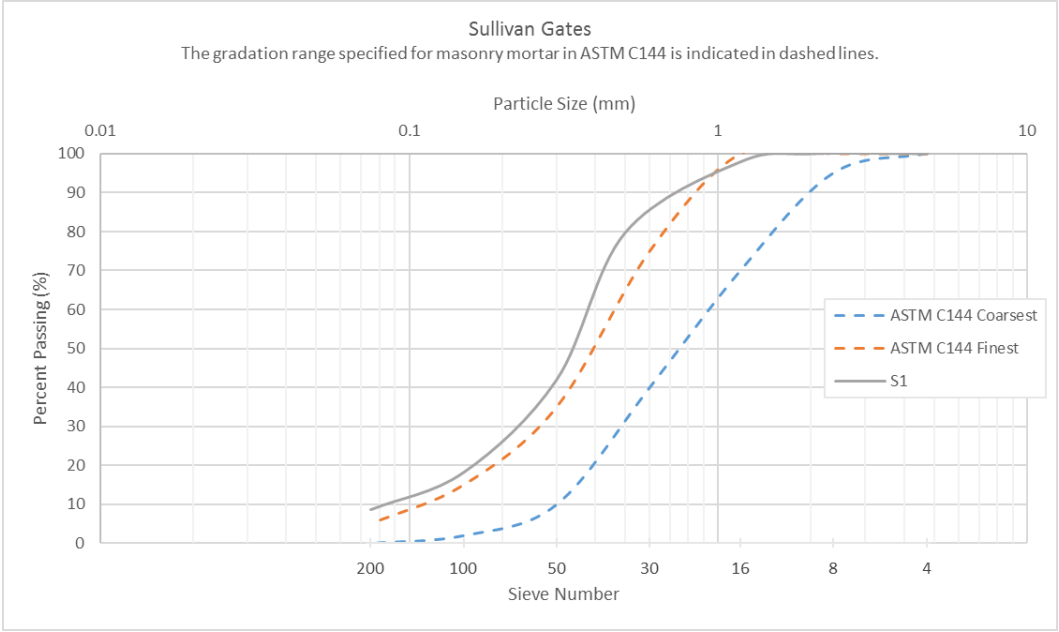


Figure 1. Aggregate distribution by sieve size for mortar sample.

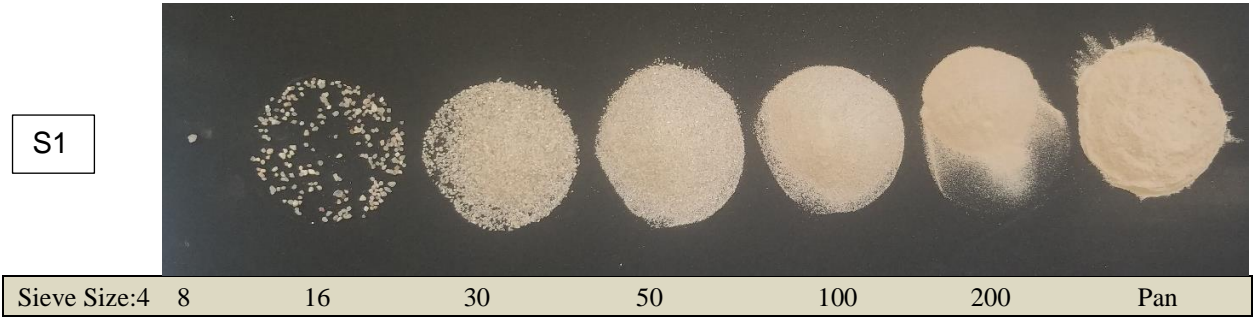


Figure 2. Aggregate distribution and color for mortar sample.

ABBREVIATIONS

©	AT	H	HEIGHT
A.F.F.	ABOVE FINISHED	J	JUNCTION
	FLOOR	MAT'L	MATERIAL
BLDG.	BUILDING	MAX.	MAXIMUM
B.O.	BOTTOM OF	MFG.	MANUFACTURING
CD	CITY & COUNTY OF DENVER	MFR.	MANUFACTURER
COL.	COLUMN	MIN.	MINIMUM
CLG.	CEILING	MISC.	MISCELLANEOUS
CONT.	CONTINUOUS	MTL.	METAL
CONST.	CONSTRUCTION	N.I.C.	NOT IN CONTRACT
CL	CENTERLINE	NO.	NUMBER
CLR.	CLEAR	N	NORTH
DET.	DETAIL	N.T.S.	NOT TO SCALE
D.S.	DOWN SPOUT	O.C.	ON CENTER
DIA.	DIAMETER	OPNG.	OPENING
DIM.	DIMENSION	OPP.	OPPOSITE
DN	DOWN	PL	PROPERTY LINE
(E)	EXISTING	PLYWD.	PLYWOOD
EA.	EACH	PT.	PAINT
ELEC.	ELECTRICAL	PW	PUBLIC WORKS
ELEV.	ELEVATION	REFER.	REFERENCE
EQ.	EQUAL	REINF.	REINFORCEMENT/ REINFORCED
EXT.	EXTERIOR	RELOC.	RELOCATE/ RELOCATED
FD	FLOOR DRAIN	REQ'D.	REQUIRED
F.F.	FINISHED FACE	REM.	REMOVED
FIN.	FINISH	R.O.	ROUGH OPENING
FLR.	FLOOR	R.O.W.	RIGHT OF WAY
FT.	FEET	(S)	SEALANT
F.O.	FACE OF	SALV.	SALVAGE
GA.	GAUGE	SIM.	SIMILAR
GALV.	GALVANIZED	SPEC.	SPECIFICATIONS
GR.	GRADE	SQ.	SQUARE
G.C.	GENERAL CONTRACTOR	T.O.	TOP OF
GFI	GROUND FAULT INTERRUPTER	TYP.	TYPICAL
HDWR.	HARDWARE	U.O.N.	UNLESS OTHERWISE NOTED
HORIZ.	HORIZONTAL	VERT.	VERTICAL
		U/S	UNDERSIDE
		V.I.F.	VERIFY IN FIELD
		W/	WITH
		W	WIDE
		WD.	WOOD
		WP	WATER PROOF

SHEET INDEX

GENERAL INFORMATION	LANDSCAPE
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G0.2 Site Plan	L2.0 Layout and Materials Plan
SS1.0 Topographic Survey	L3.0 Grading Plan
	L3.1 Grading Images
ARCHITECTURAL	L4.0 Site Details
A1.0 East Plan	L4.1 Site Details
A1.1 Elevations and Sections	L5.0 Planting Plan
A1.2 Enlarged Plans and Details	L5.1 Planting Details
A1.3 Details	I1.0 Irrigation Notes and Schedule
A1.4 Wall Elevation	I1.1 Irrigation Plan
A2.0 East Repair Plan	I1.2 Irrigation Details
A2.1 Enlarged Wall Elevation	
A2.2 Enlarged Wall Elevation	ELECTRICAL
A2.3 Enlarged Wall Elevation	E1.0 Electrical Site Plan, Legend and Schedule
A2.4 Enlarged Wall Elevation	
A2.5 Enlarged Wall Elevation	
A2.6 Enlarged Wall Elevation	
A2.7 Enlarged Wall Elevation	
A2.8 Enlarged Wall Elevation	
A2.9 Enlarged Wall Elevation	

GENERAL NOTES

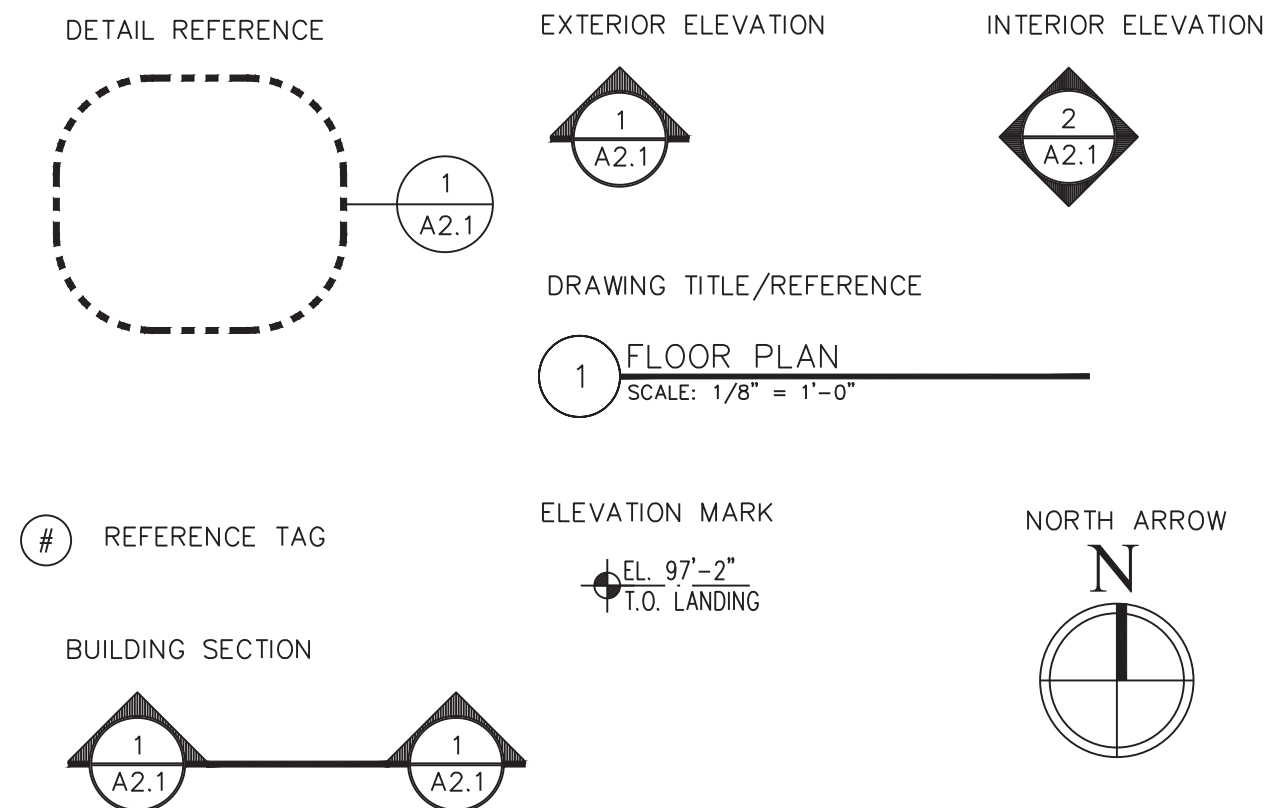
- DO NOT SCALE DRAWINGS
- ALL WORK TO BE PERFORMED TO APPLICABLE BUILDING CODES
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARIZING HIM OR HERSELF WITH THE CONTRACT DOCUMENTS, VERIFYING FIELD CONDITIONS AND DIMENSIONS, AND CONFIRM THAT THE WORK MAY BE ACCOMPLISHED AS SHOWN PRIOR TO PROCEEDING WITH CONSTRUCTION.
- SHOULD THERE BE ANY QUESTIONS CONCERNING THE CONTRACT DOCUMENTS, EXISTING CONDITIONS, AND/OR DESIGN INTENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A CLARIFICATION FROM THE ARCHITECT PRIOR TO PROCEEDING WITH THE WORK, OR RELATED WORK IN QUESTION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARIZING HIM OR HERSELF WITH THE PROJECT SCOPE OF WORK, SCHEDULE, AND DEADLINES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADVISING THE ARCHITECT OF ALL ITEMS REQUIRING A LONG LEAD TIME THAT WILL AFFECT THE SCHEDULE, AND SHALL UPON REQUEST FROM THE OWNER, SUBMIT ORDER CONFIRMATIONS AND DELIVERY DATES FOR THE ITEMS IN QUESTION TO THE OWNER.
- EXISTING WORK WHICH IS TO REMAIN SHALL BE REPAIRED AND/OR RECONDITIONED AS REQUIRED TO MATCH AND BLEND WITH ALL NEW WORK, AS STATED IN NOTES ON THE DRAWINGS.
- INSTALL ALL MANUFACTURED ITEMS, MATERIALS, AND EQUIPMENT IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDED SPECIFICATIONS, EXCEPT WHERE THE CONTRACT DOCUMENTS ARE MORE STRINGENT. ANY MISCELLANEOUS ITEMS OR MATERIALS NOT SPECIFICALLY NOTED, BUT REQUIRED FOR PROPER INSTALLATION SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. THE CONTRACTOR SHALL FURNISH TO THE OWNER ALL WARRANTIES AND GUARANTEES REQUIRED AT THE CONCLUSION OF THE PROJECT.
- ALL CONTRACTOR OR SUPPLIER REQUESTS FOR SUBSTITUTIONS OF SPECIFIED ITEMS SHALL BE SUBMITTED IN WRITING TO THE ARCHITECT AND ACCOMPANIED WITH THE ALTERNATIVE PRODUCT INFORMATION. SUBSTITUTIONS WILL BE CONSIDERED ONLY IF IT DOES NOT SACRIFICE QUALITY, APPEARANCE, OR FUNCTION.
- COORDINATE WITH DENVER PARKS AND RECREATION TO LOCATE SUITABLE CONSTRUCTION STORAGE AREA. CONTRACTOR RESPONSIBLE FOR RESTORING CONSTRUCTION STORAGE AREA TO ORIGINAL CONDITION AT CONTRACTOR'S EXPENSE.
- STORE SALVAGED MATERIAL IN SECURE AND LOCKED CONTAINER IF LOCATED AT PROJECT SITE.
- SUBMIT PROPOSED SALVAGE INVENTORY TO ARCHITECT FOR REVIEW AND APPROVAL 2 WEEKS PRIOR TO REMOVAL.
- PROTECT IRRIGATION AND EXISTING FEATURES WITHIN PROJECT SITE. ANY DAMAGE WILL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO RESTORE AT CONTRACTOR'S EXPENSE.
- RESTORE TURF DAMAGE AT PROJECT SITE
- PROTECT AND PROVIDE SECURE PEDESTRIAN ACCESS DURING CONSTRUCTION ACTIVITIES.
- CONTRACTOR SHALL TAKE REASONABLE MEASURES TO PREVENT PARTICULATE MATTER FROM BECOMING AIRBORNE AND TO PREVENT THE VISIBLE DISCHARGE OF FUGITIVE PARTICULATE EMISSIONS BEYOND THE PROPERTY ON WHICH THE EMISSIONS ORIGINATE. THE MEASURES TAKEN MUST BE EFFECTIVE IN THE CONTROL OF FUGITIVE PARTICULATE EMISSIONS AT ALL TIMES ON THE SITE, INCLUDING PERIODS OF INACTIVITY SUCH AS EVENINGS, WEEKENDS, AND HOLIDAYS AS WELL AS ANY OTHER PERIOD OF INACTIVITY.
- IF UNKNOWN/UNIDENTIFIED UNDERGROUND STORAGE TANKS, DRUMS, ODOROUS SOIL, STAINED SOIL, ASBESTOS-CEMENT PIPE, TRANSITE, BUILDING DEBRIS OR WASTE MATERIALS ARE ENCOUNTERED DURING THE PROJECT, CONTRACTOR SHALL IMMEDIATELY STOP WORK IN THE AREA OF THE DISCOVERY UNTIL DENVER ENVIRONMENTAL HEALTH (DEH) MAKES A DETERMINATION OF HOW TO PROCEED. CONTRACTOR SHALL IMMEDIATELY NOTIFY DEH OF THE DISCOVERY VIA THE PHONE NUMBER 720-460-1706.
- THE CONTRACTOR SHALL DIRECT NON-RECYCLABLE, NON-HAZARDOUS WASTES FROM CCD-OWNED OR CONTROLLED PROPERTY OR FACILITIES TO THE DENVER ARAPAHOE DISPOSAL SITE (DADS) LANDFILL FOR DISPOSAL, FOLLOWING THE REQUIREMENT AND PROCEDURAL GUIDANCE OUTLINED IN CCD'S EXECUTIVE ORDER 115.
- ANY FILL MATERIAL OR SOILS TO BE MOVED TO AND PLACED ON CCD-OWNED PROPERTY OR PLACED ON REAL PROPERTY TO BE TRANSFERRED TO THE CCD MUST BE FREE OF KNOWN CONTAMINATION (OBSERVED OR PREVIOUSLY DOCUMENTED) AND BE ACCEPTABLE FOR UNRESTRICTED RESIDENTIAL USE. CONTACT DAVE ERICKSON, DENVER ENVIRONMENTAL HEALTH (720-865-5433) FOR CLARIFICATION, IF NEEDED, REGARDING THIS CCD REQUIREMENT.
- NOISE CONTROL. EXEMPTED HOURS FOR CONSTRUCTION IN THE CITY AND COUNTY OF DENVER ARE FROM 7 A.M. TO 9 P.M. MONDAY THROUGH FRIDAY AND 8 A.M. TO 5 P.M. ON SATURDAYS AND SUNDAYS PER SECTIONS 36-6.(B)(7) AND 36-7.(5)A., B. AND C. OF DENVER'S NOISE ORDINANCE, CHAPTER 36 "NOISE CONTROL," DENVER REVISED MUNICIPAL CODE (DRMC). IF THERE IS AN ANTICIPATED NEED TO WORK OUTSIDE OF THE EXEMPTED HOURS FOR CONSTRUCTION: 1) THE CONTRACTOR WILL NEED TO MAKE A REQUEST FOR A NIGHTTIME NOISE VARIANCE AS ALLOWED FOR IN SECTION 36-7.(5)C. OF THE DRMC AND 2) THE VARIANCE PROCESS NEEDS TO BE STARTED A MINIMUM OF TWO TO THREE MONTHS PRIOR TO THE DESIRED START DATE OF ANY WORK NEEDING TO OCCUR OUTSIDE OF EXEMPTED HOURS. ANY NOISE VARIANCE QUESTIONS SHOULD BE DIRECTED TO PAUL RIEDESEL, DEPARTMENT OF ENVIRONMENTAL HEALTH, DENVER COMMUNITY NOISE PROGRAM. (PHONE 720-865-5410; FAX 720-865-5532) A MINIMUM OF THREE MONTHS PRIOR TO THE START OF THE PROJECT.
- IF ANY CITY ROW SIDEWALK OR STREET CLOSURE IS NEEDED FOR CONSTRUCTION OR MATERIAL STORAGE – A CITY PUBLIC WORKS ROW OCCUPANCY PERMIT WOULD BE REQUIRED, WITH NO FEE FOR THIS PROJECT. A. "THE CONTRACTOR SHOULD SUBMIT SITE SPECIFIC MHT (METHOD OF HANDLING TRAFFIC) WITH A RSOP (REVOCABLE STREET OCCUPANCY PERMIT) REQUEST FORM TO CONSTRUCTION ENGINEERING AT LEAST 10 BUSINESS DAYS PRIOR TO NEEDING ANY STREET OCCUPANCY PERMIT (INCLUDING SIDEWALK CLOSURE). THE USE OF TYPICAL TRAFFIC CONTROL PLANS (TCP) IS LIMITED TO USE ON LOCAL OR RESIDENTIAL STREETS. SEND TO WMDPWDESC@DENVERGOV.ORG, OR CALL 303-446-3469 TO BE DIRECTED TO THE PROPER AREA INSPECTOR OR ENGINEER FOR QUESTIONS. ALSO CALL TO INVITE THE AREA INSPECTOR TO YOUR PRECONSTRUCTION MEETING. B. PRIOR TO THE START OF ANY RIGHT OF WAY WORK, THE CONTRACTOR SHOULD HAVE A PRECONSTRUCTION CONFERENCE AND INVITE PW ROWS CONSTRUCTION ENGINEERING. CALL 303-446-3469. C. ALL WORK IN THE ROW SHALL MEET CCD TS&D [TRANSPORTATION STANDARDS & DETAILS, LATEST EDITION.



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Jeru Parikh
720.913.0619 (p)

ARCHITECT
Anderson Hallas Architects, PC

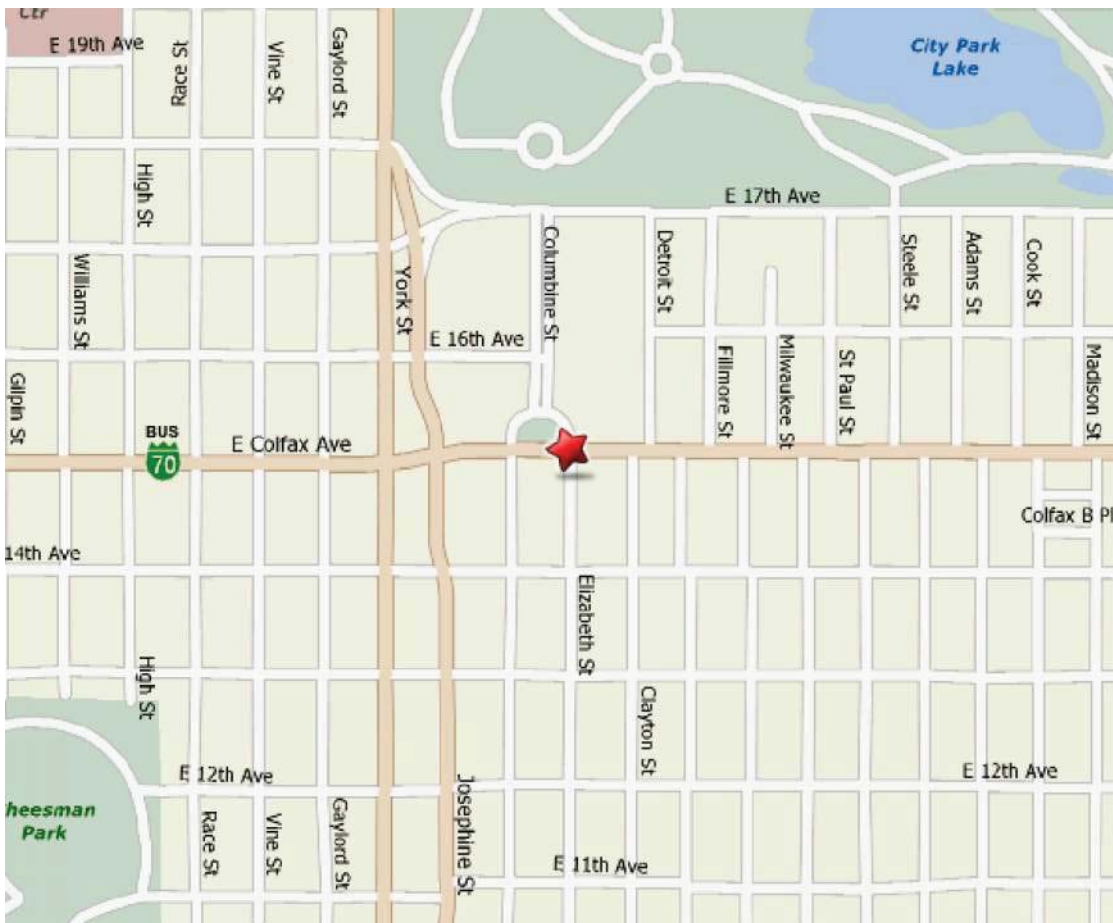
715 Fourteenth Street
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Elizabeth Hallas, AIA, Principal-in-Charge
Kristen Craig, AIA
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303.278.0521 (f)

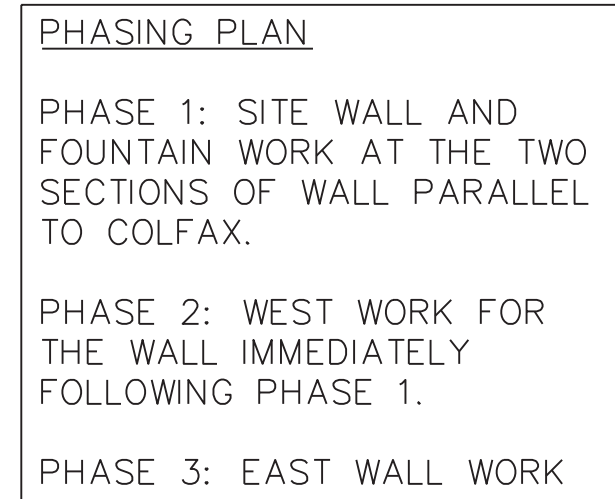
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PLANNING

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PHASE 3 WORK SHALL INCLUDE ALL
ARCHITECTURAL AND LANDSCAPE WORK
NECESSARY TO REHABILITATE THE EAST WALL
AND ELECTRICAL WORK FOR SITE LIGHTS

--*FOR CONSTRUCTION*--
100% CONSTRUCTION DOCUMENTS
SET

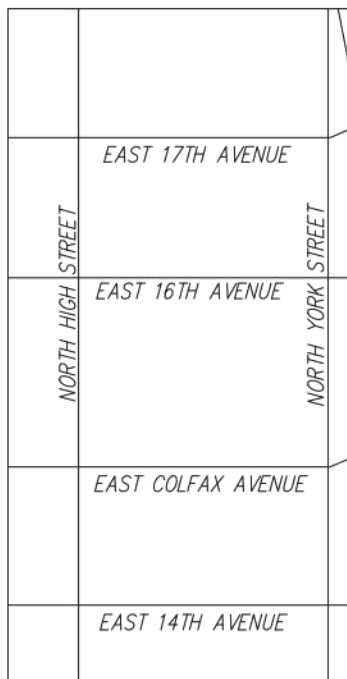


Project No.	2017880
Issue	PHASE 3 100% CD's
Date	03/08/2018
Drawn by	KAC
Checked by	EMH
Scale	Scale

SITE PLAN

G0.2

SHEET 1 OF 1



VICINIT
NOT TO

ACCESS TO THE PROPERTY IS OBTAINED DIRECTLY VIA COLUMBINE ST. & ELIZABETH ST.

2) DATE OF LAST FIELD INSPECTION: MARCH 10, 2015.

3) THE BASIS OF BEARING IS THE 20' RANGE LINE OF 16TH AVENUE ALONG QUARRY STREET AND CITY PARK ESPLANADE AS SHOWN ON PLAT OF STATE ADDITION, BLOCKS 19 INCLUSIVE AND SAID BEARING IS N 50°00'07"E AS DEFINED BY A FOUND 3.25" ALUMINUM CAP "HERRICK IS 335200" IN A RANGE BOX AT THE WEST END OF THE LINE AND A 3.5" ALUMINUM CAP "DEA PLS 268600" AT THE EAST END OF THE LINE DESCRIBED.

4) THIS MAP OR PLAT WAS PREPARED FOR THE EXCLUSIVE USE OF THE PERSON, PERSONS OR ENTITY NAMED IN THE SURVEYOR'S STATEMENT HEREON. SAID STATEMENT DOES NOT EXTEND TO ANY UNNAMED PERSON WITHOUT AN EXPRESS RE-STATEMENT BY THE SURVEYOR.

5) NOTICES: ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE (3) YEARS AFTER THE DATE OF DISCOVERY OF SUCH DEFECT. YOU MAY COMMENCE ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED UPON MORE THAN TEN (10) YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON. C.R.S.13-60-105(3)(c).

6) FEMA FLOOD INSURANCE RATE MAP, MAP NO. 0804660202 C WITH AN EFFECTIVE DATE OF 11/17/2005 INDICATES THIS PROPERTY TO BE DESIGNATED AS ZONE X (AREA OUTSIDE 0.2% ANNUAL CHANCE FLOODPLAIN). THIS SURVEY MAKES THIS STATEMENT BY GRAPHIC PLOTTING ONLY. THE SURVEYOR RECOMMENDS A FLOOD STUDY IF MORE INFORMATION IS REQUIRED.

7) ALL LINEAL MEASUREMENTS SHOWN ARE U.S. SURVEY FEET.

8) EASEMENTS AND PUBLIC DOCUMENTS SHOWN OR NOTED ON THIS SURVEY WERE EXAMINED AS TO LOCATION AND PURPOSE AND WERE NOT EXAMINED AS TO RESTRICTIONS, EXCLUSIONS, CONDITIONS, OBLIGATIONS OR AS THE RIGHT TO GRANT THE SAME. NO TITLE REPORT WAS PROVIDED BY OR REQUIRED BY THE CLIENT.

9) ELEVATIONS ARE BASED ON CITY AND COUNTY OF DENVER BENCHMARK NO. 52B LOCATED AT THE SOUTHEAST CORNER OF EAST COLFAX AVENUE AND JOSEPHINE STREET. CONTOURS SHOWN ARE AT 0.5' INTERVALS

10) THIS IS NOT A MONUMENTED LAND SURVEY PLAT OR A BOUNDARY SURVEY. ANY RIGHT OF WAY OR PARENT PARCEL LINES SHOWN ARE BASED ON PRIOR SURVEY WORK PERFORMED IN THE AREA FOR OTHER PURPOSES AND ARE FOR DEFLECTION ONLY. THIS SURVEY IS ONLY INTENDED TO DEPICT THE TOPOGRAPHICAL FEATURES IN THE AREA SHOWN.

I, BRIAN J. DENNIS, A REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF, THIS MAP WAS PREPARED FROM AN ACTUAL ON THE GROUND SURVEY MADE BY ME OR UNDER MY DIRECT SUPERVISION AND SHOWS THE RESULTS OF SAID SURVEY AND THE MONUMENTS FOUND OR SET ARE AS SHOWN

BRIAN J. DENNIS
COLORADO PROFESSIONAL LAND SURVEYOR NO. 38069
Project No.: CCDN0000-0045-001
for and on behalf of DAVID EVANS & ASSOCIATES, INC.

Project No.	2017880
Issue	
Date	03/12/2015
Drawn by	
Checked by	
Scale	1:20

SS1.0

Notice: According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you first discover such defect. In no event may any action based upon any defect in this survey be commenced more than ten years from the date of the certification shown hereon.

Notice: According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you first discover such defect. In no event may any action based upon any defect in this survey be commenced more than ten years from the date of the certification shown hereon.

Utility Note: Any underground utilities shown have been located from field survey information and/or existing drawings. The surveyor makes no guarantee either expressed or implied that the underground utilities shown comprise all such utilities in the area, either in service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location depicted. Underground utilities are located as accurately as possible from the information available at the time of the survey. Utilities shown are based from available utility maps and above ground utility markings performed by others. This surveyor has not physically located the underground utilities.

CITY AND COUNTY OF DENVER
REAL ESTATE DIVISION
201 WEST COLFAX AVENUE
DENVER, CO 80202

1331 17th Street Suite 900
Denver, Colorado 80202
Tel: 720-946-0969
Fax: 720-946-0973

Engineers • Surveyors • Planners

**EAST COLFAX AVENUE & COLUMBINE
STREET & ELIZABETH STREET
CITY AND COUNTY OF DENVER, COLORADO**

ORIGINAL DATE SUBMITTED: 03.12.15

--FOR CONSTRUCTION--
100% CONSTRUCTION DOCUMENTS
SET

TERRA COTTA REHABILITATION

1. REMOVE ALL PAINT AND CLEAN AND INVENTORY ALL TERRA COTTA.
2. REMOVE TERRA COTTA PIECES TO BE REPLACED. LABEL, PALLETIZE, PROTECT AND STORE ANY ADJACENT PIECES WHICH ARE REMOVED FOR REINSTALLATION AS PER TERRA COTTA SURVEY.
3. REPAIR BRICK SUBSTRATE WALL. ANTICIPATE 10% OF WALL TYPICALLY INCLUDING RESETTING & REPOINTING AS NEEDED WHERE BRICK IS EXPOSED. SALVAGE EXISTING ANCHORS FOR REUSE WHERE APPLICABLE. ANCHORS SHALL BE REPLACED WITH NEW STAINLESS STEEL. INSTALL NEW STAINLESS STEEL ANCHORS AT TERRACOTTA PIECE INSTALLATION. ANTICIPATE SELECT BRICK/JOINT REMOVAL AND REPAIR TO ALLOW INSTALL OF NEW ANCHORS.
4. RESTORE TERRA COTTA VENEER PIECES AS PER SURVEY.
5. REINSTALL (INSTALL) TERRA COTTA VENEER SALVAGED, RESTORED (AND NEW) PIECES, THROUGH MORTARED.
6. INSTALL SEALANT AS PER PLANS AT CAP PIECES
7. INSTALL ANTI GRAFFITI COATING TO ALL TERRA COTTA SURFACES



Anderson Hallas
Architects, PC

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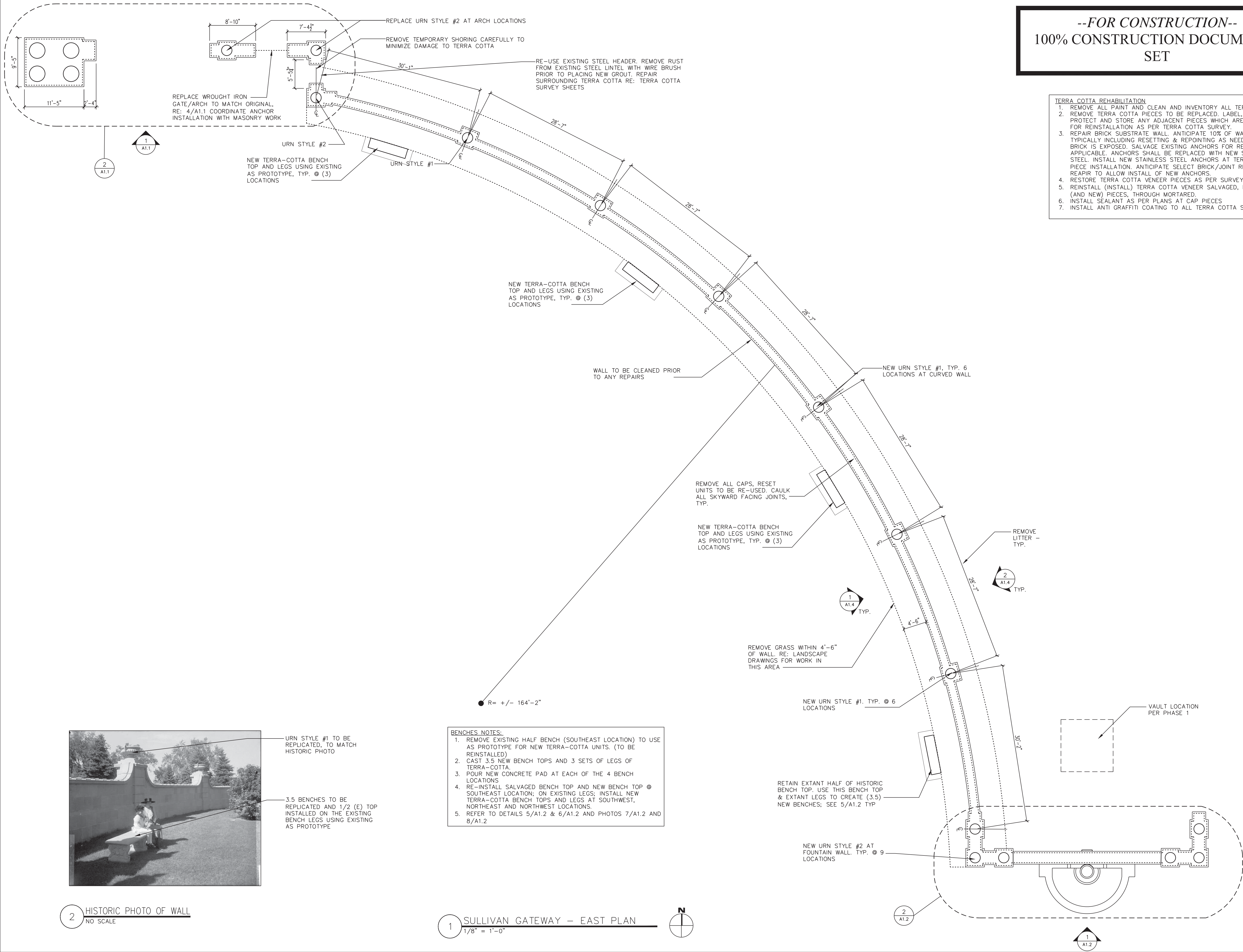
SULLIVAN GATEWAY
Gateway Rehabilitation
Colfax Ave & Elizabeth St.

No.	Description	Date

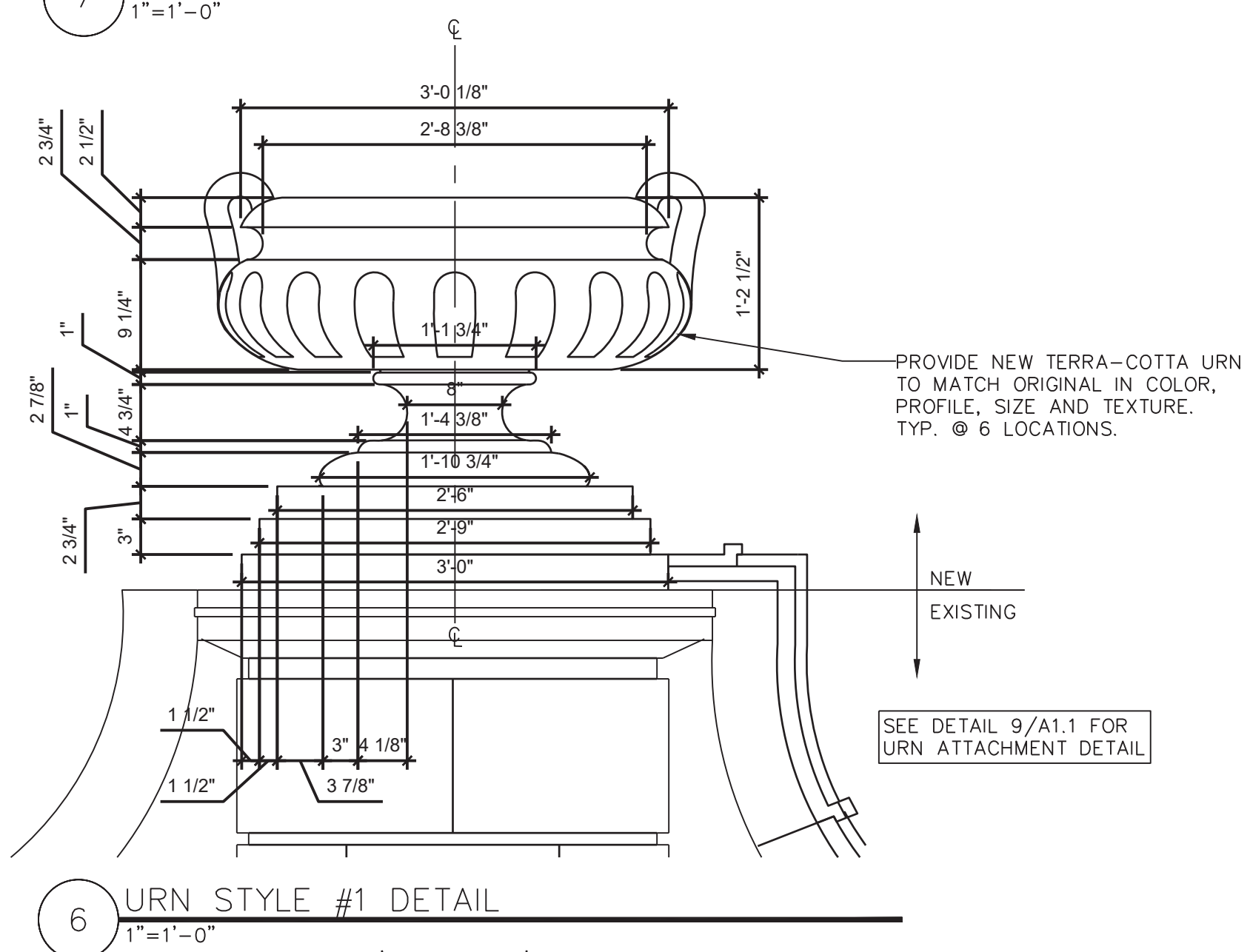
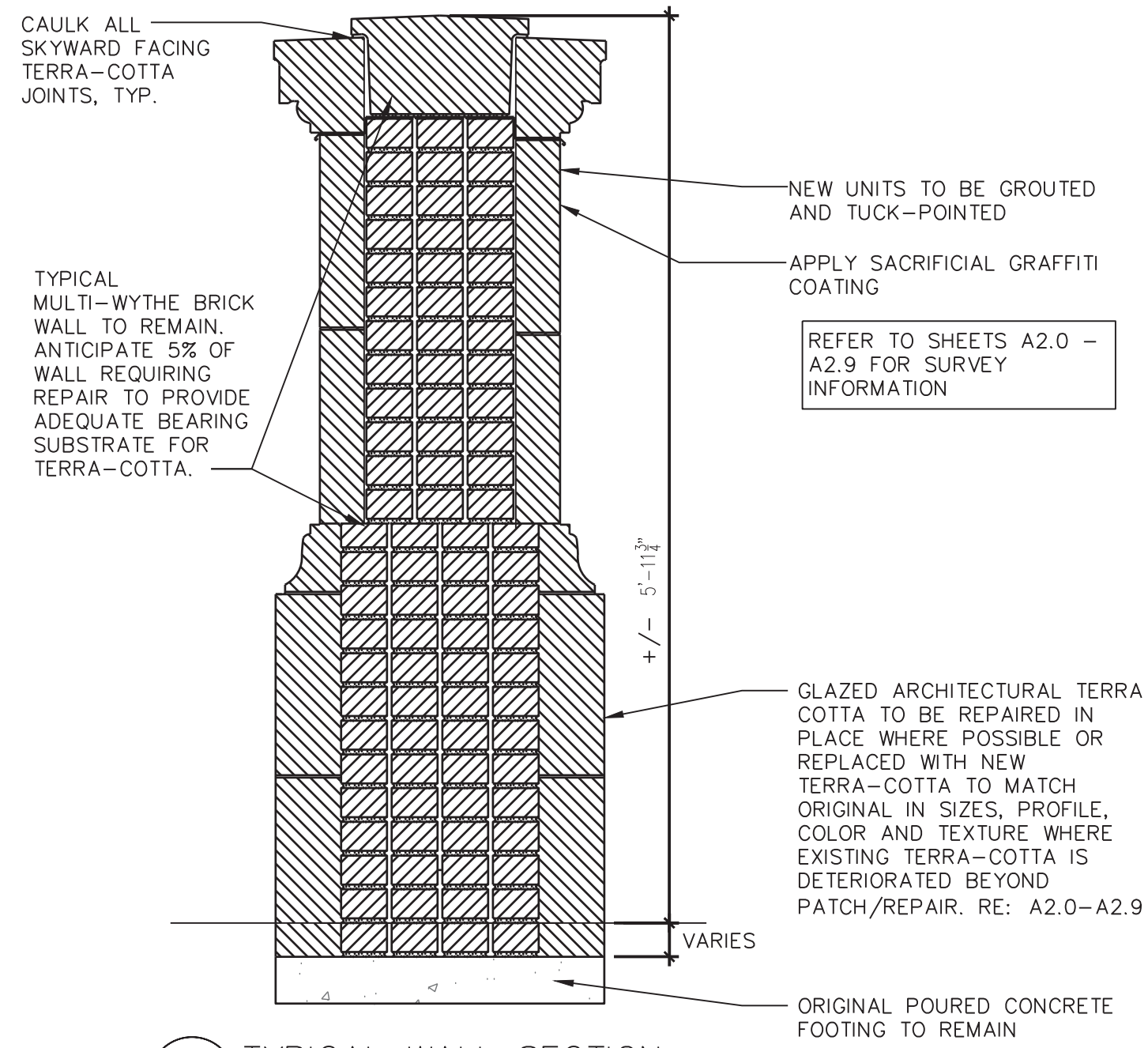
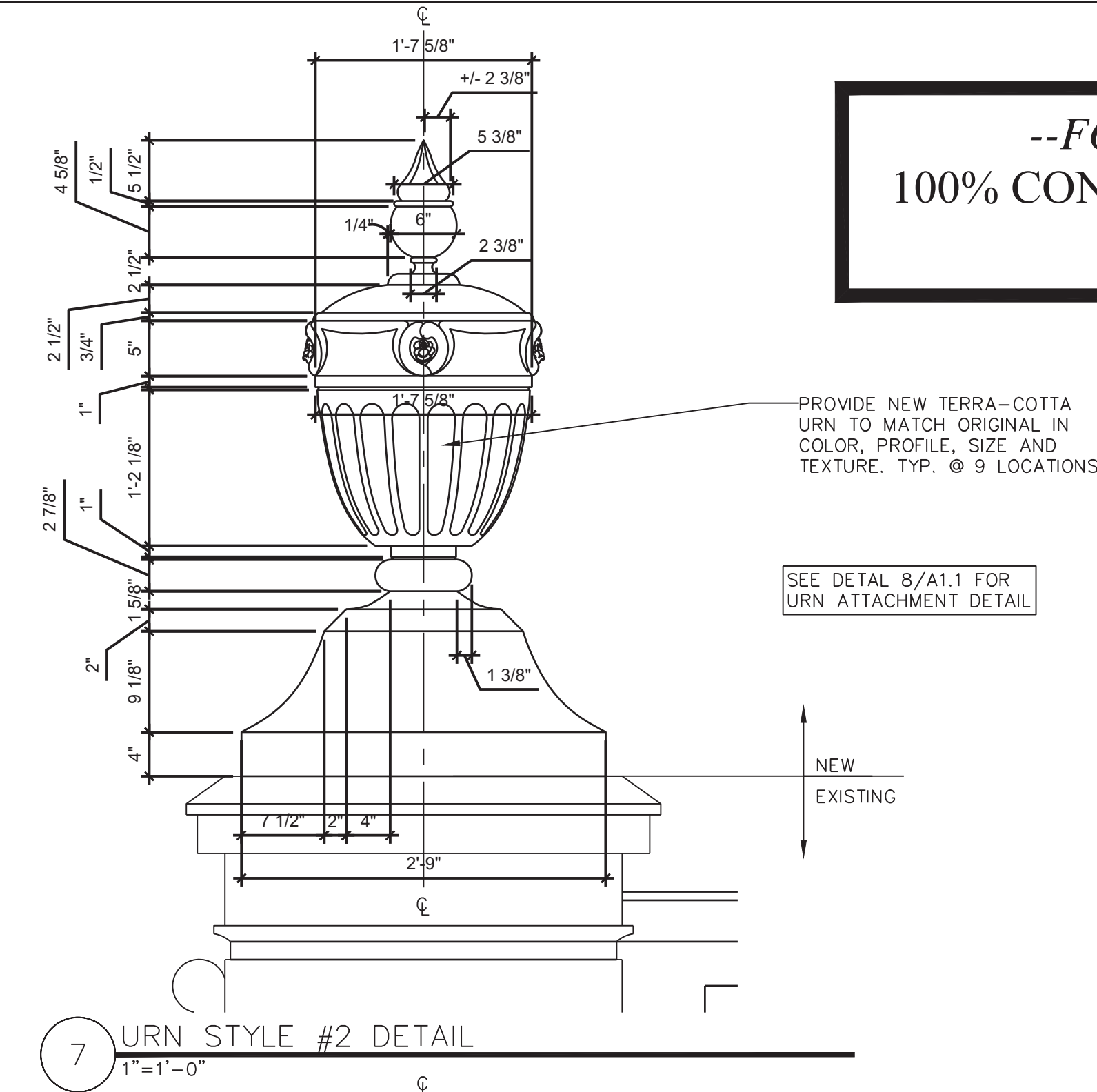
Project No.	2017880
Issue	PHASE 3 100% CD's
Date	03/08/2018
Drawn by	KAC
Checked by	EMH
Scale	

EAST PLAN

A1.0



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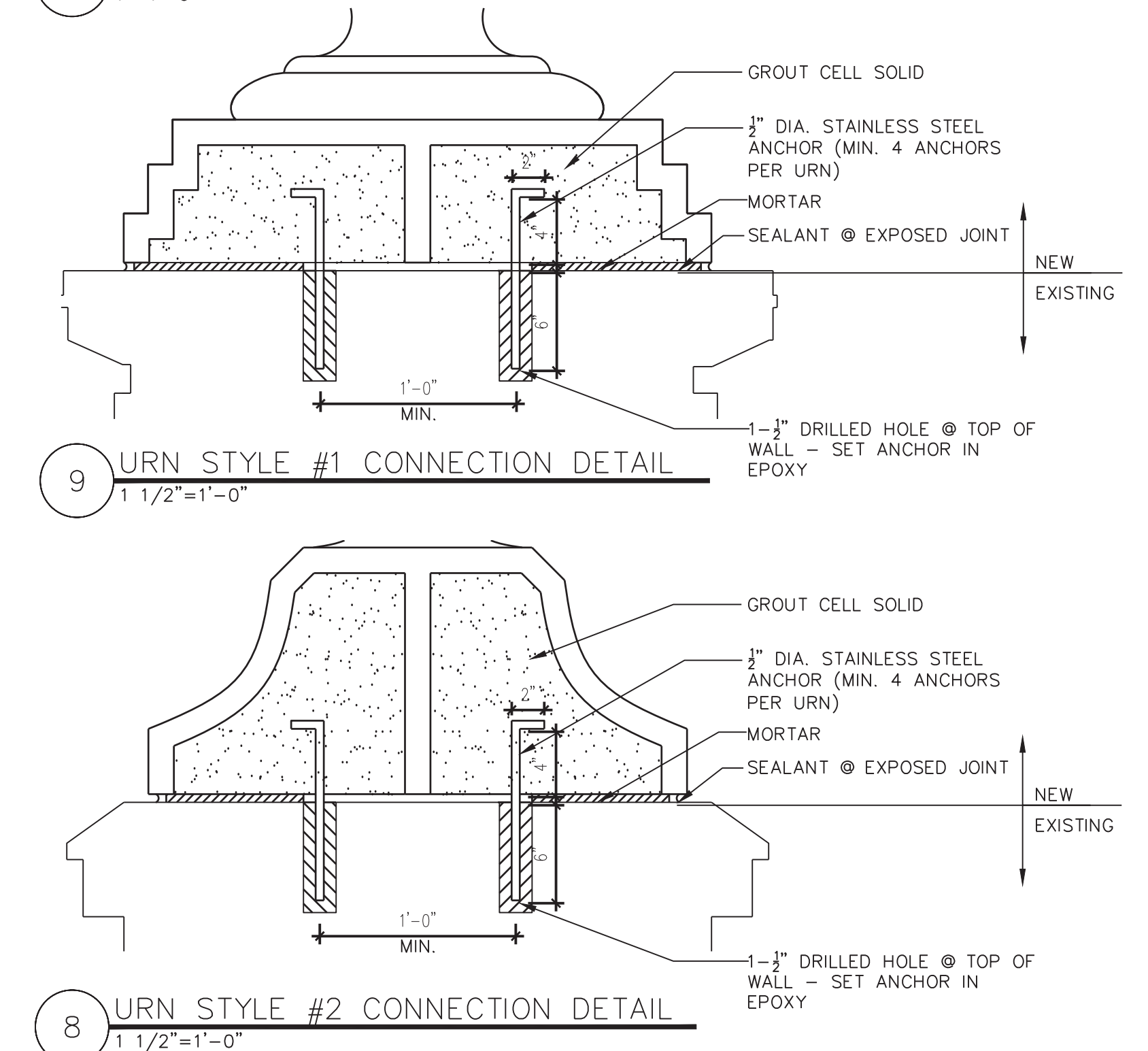
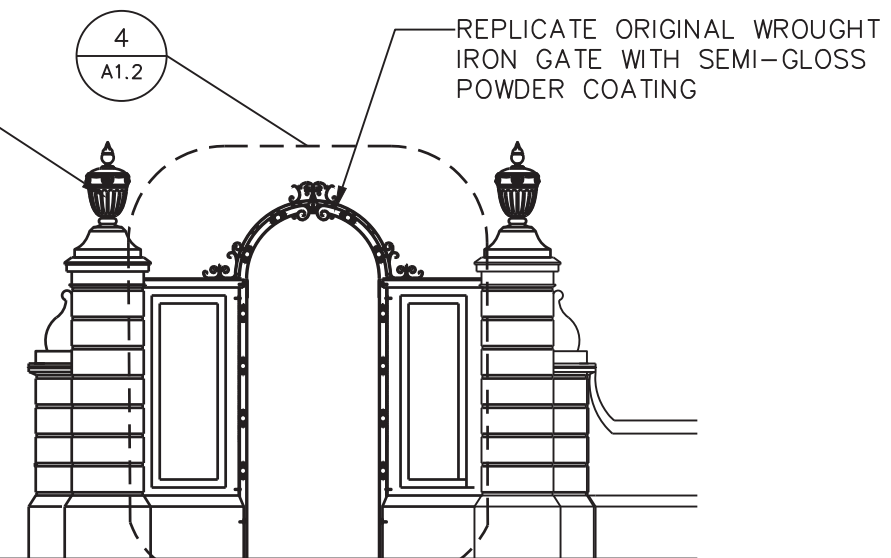
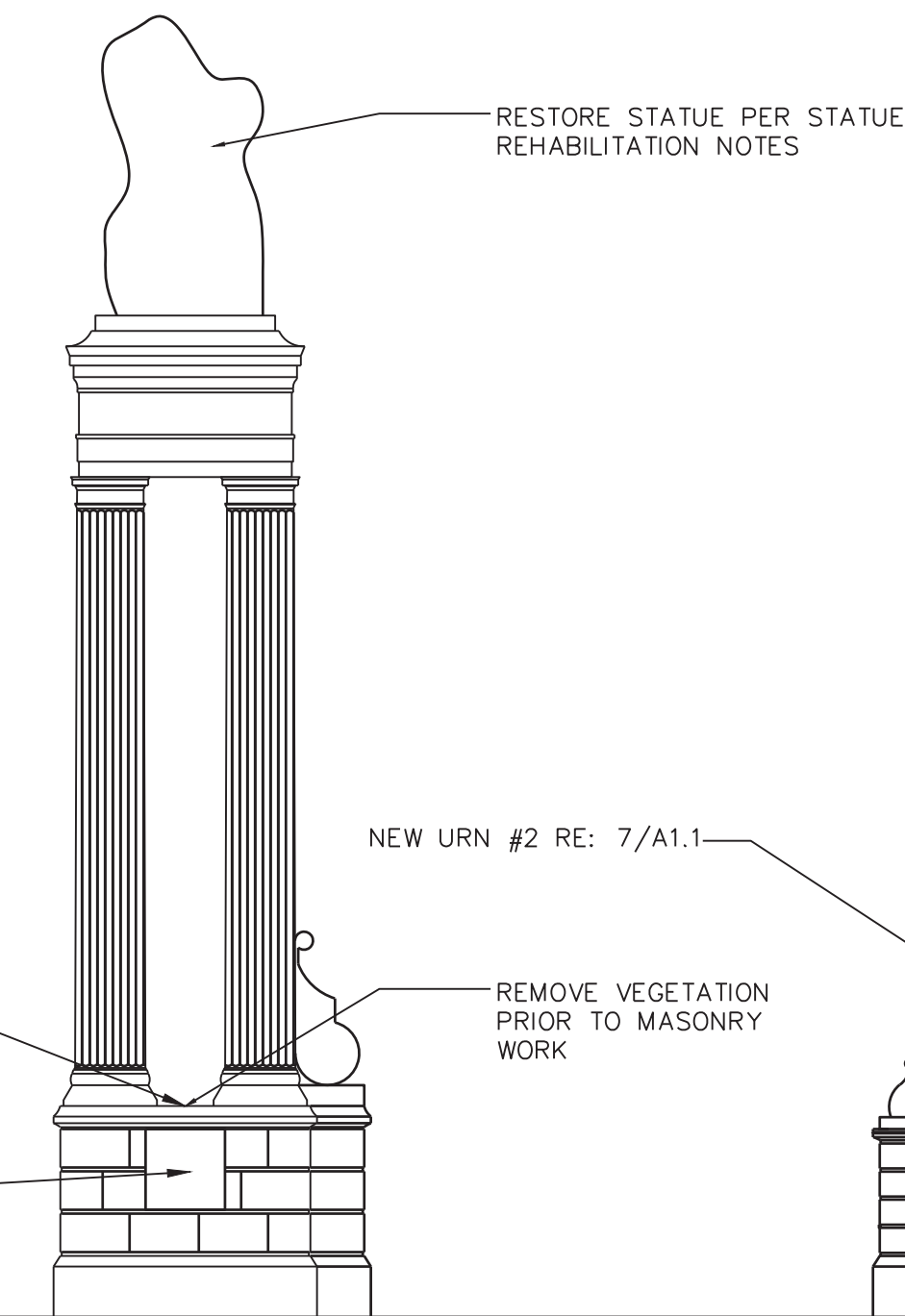


STATUE REHABILITATION

1. WASH STATUE TO REMOVE FOREIGN DEBRIS FROM SURFACE AND TO ALLOW FOR NEW MATERIALS TO BOND TO A CLEAN SURFACE
2. REMOVE EXISTING LOOSE SECTIONS OF THE STATUE AND REPLACE/RE-SCULPT TO BRING BACK ORIGINAL PROFILES AND DETAILING
3. PATCH AS NECESSARY AT CRACKS AND REMOVE DELAMINATING AREAS
4. RESURFACE THE ENTIRE EXTERIOR SURFACE WITH A LIKE/IN KIND MATCHING EXISTING MATERIAL WITH INTEGRATED COLOR
5. REPLACE RUSTED VENTS AS NECESSARY AND RE-SCREEN THE VENT HOLES AND RAIN CATCHES



— REMOVE RAISED PORTIONS ON
TERRA COTTA PIECES BETWEEN
COLUMNS. PATCH/GLAZE
TERRA COTTA AND INSTALL
SEALANT AT THE JOINTS



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SULLIVAN GATEWAY

Gateway Rehabilitation
Colfax Ave & Elizabeth St.

[illegible]

Project No.	2017880
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Issue	PHASE 3 100% CD's
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Date	03/08/2018
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Drawn by	KAC
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Checked by	EMH
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Scale

ELEVATIONS & SECTIONS

A1.1

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Date	03/08/2018
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A1.2



Technical drawing of a decorative chair backrest. The drawing shows a side view of the backrest with various dimensions labeled. The overall width is 1'-10 1/2". The overall height is 1'-4". The backrest features a central panel with a floral and scrollwork design. The top of the backrest has a decorative crown molding. The dimensions are as follows:

- Overall width: 1'-10 1/2"
- Overall height: 1'-4"
- Top decorative crown molding height: 4 5/8"
- Width of the central panel: 1'-6"
- Height of the central panel: 10 3/8"
- Height of the top decorative crown molding: 3 1/8"
- Height of the top decorative crown molding (side view): 3 7/8"
- Height of the top decorative crown molding (side view): 5 1/8"
- Height of the top decorative crown molding (side view): 7/8"
- Height of the top decorative crown molding (side view): 5"

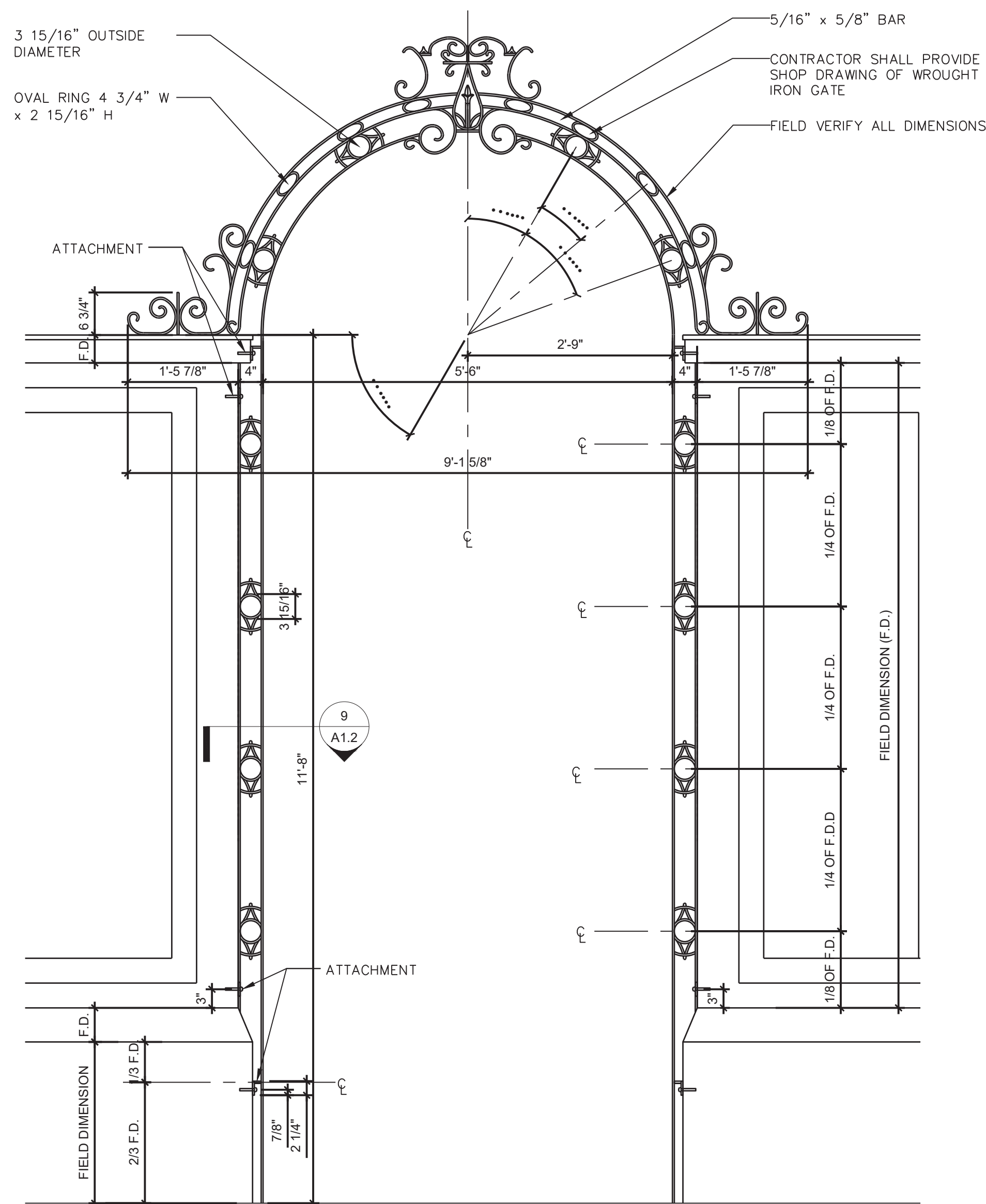
6 BENCH SIDE ELEVATION
1" = 1'-0"



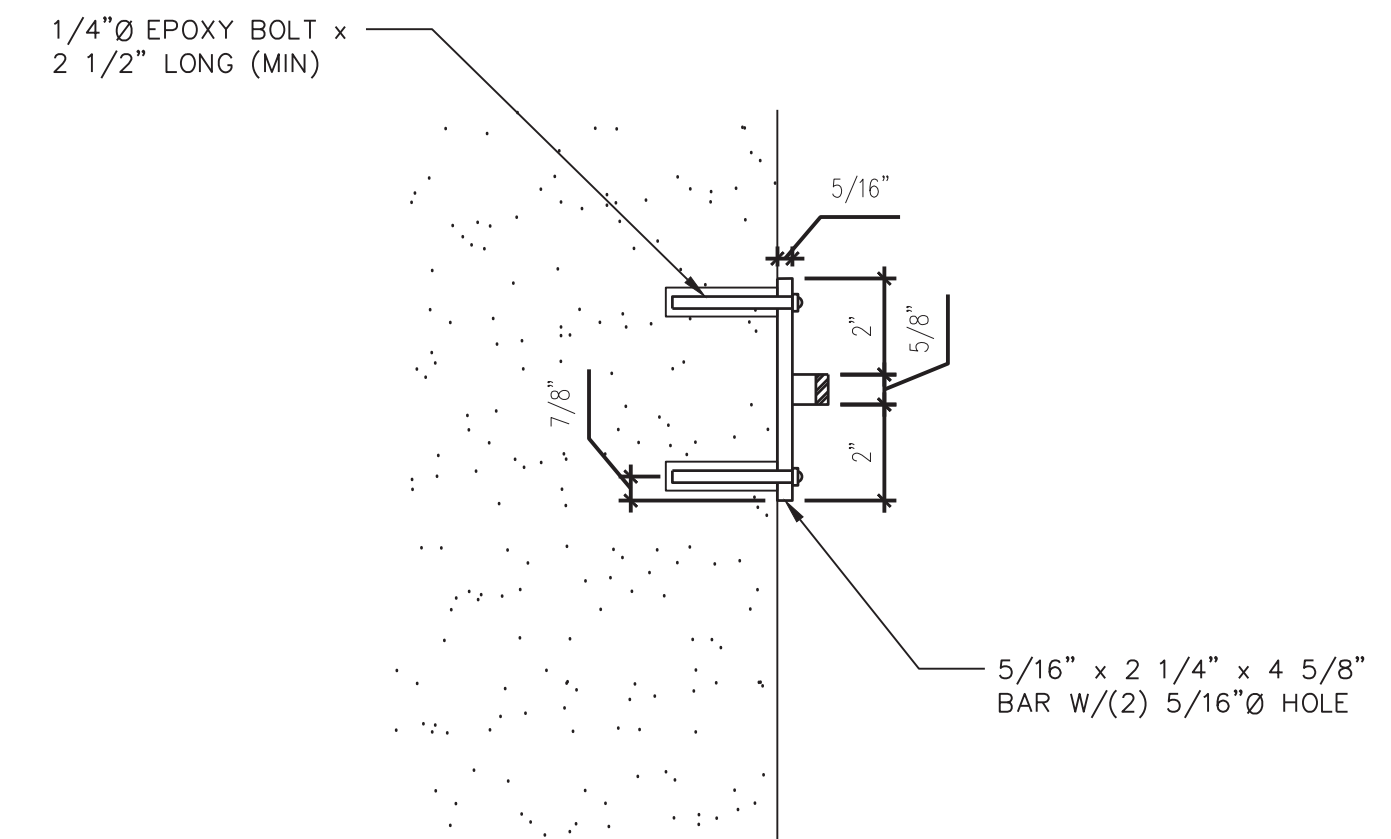
Technical drawing of a classical entablature section, showing three columns supporting a frieze and architrave. The drawing includes the following dimensions:

- Overall width: 3'-8 1/4"
- Column diameter: 3' 1/8"
- Column capital height: 1/4"
- Column capital width: 3/8"
- Column capital depth: 7/8"
- Column capital base: 5/8"
- Column capital base width: 10 3/8"
- Column capital base depth: 5"
- Column capital base width (inner): 3'-8 1/4"

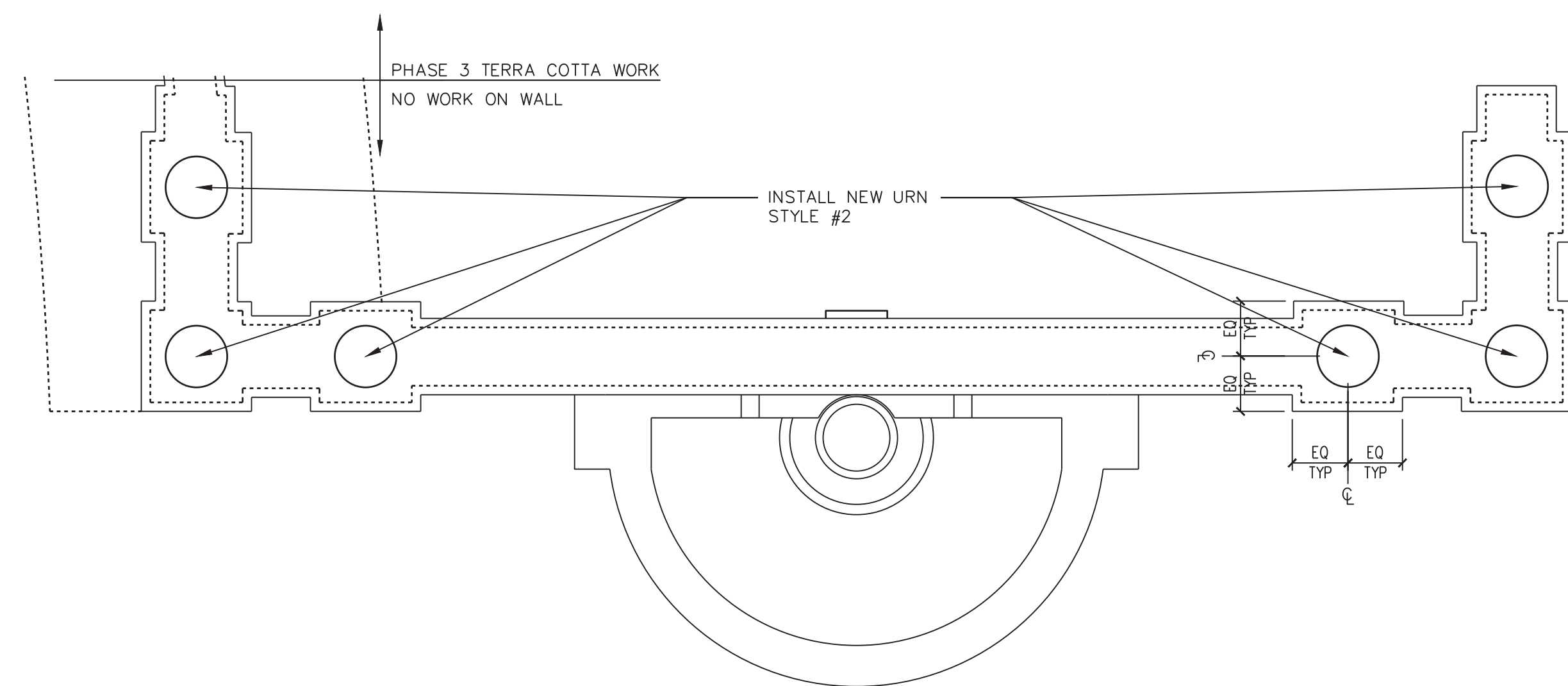
5 BENCH FRONT ELEVATION
1" = 1'-0"



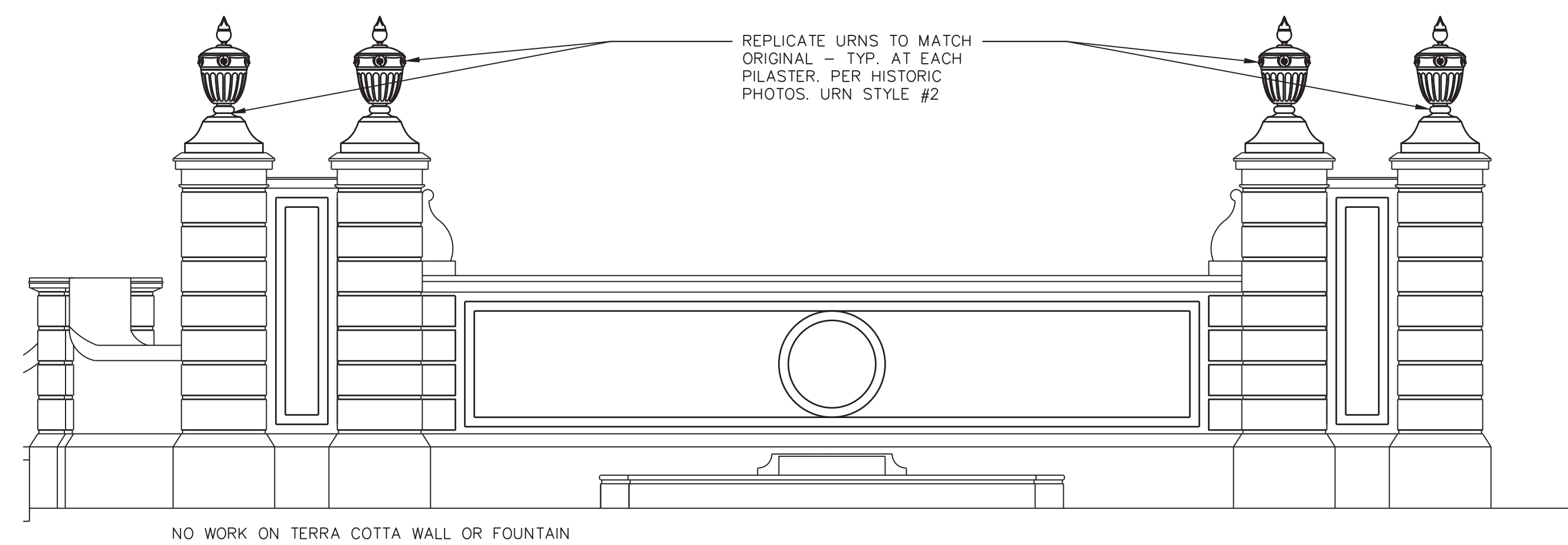
4 WROUGHT IRON GATE
3/4" = 1'-0"



9 SECTION AT GATE ATTACHMENT
3" = 1'-0"



2 EAST FOUNTAIN PLAN
1/4" = 1'-0"



1 EAST FOUNTAIN ELEVATION (FRONT)
1/4" = 1'-0"

--FOR CONSTRUCTION--
100% CONSTRUCTION DOCUMENTS
SET

1. THIN PATCH: 1/32" MIN. - 1/4" MAX
RESURFACE TO MATCH ORIGINAL
TEXTURED SURFACE. RE-GLAZE TO
MATCH EXISTING.
2. DEEPER PATCH: 1/4" MIN - 2" MAX
REBUILD TO ORIGINAL PROFILE AND
TEXTURE. RE-GLAZE TO MATCH
EXISTING. LESS THAN 50% OF SURFACE
SPALLED
3. REPLACE TERRACOTTA UNIT WITH NEW
MATCHING TERRACOTTA UNIT. MORE
THAN 50% OF THE SURFACE IS
SPALLED, UNIT HAS A HOLE IN IT OR
IT IS MISSING.



BRICK

TERRACOTTA UNIT

A cross-sectional diagram showing a rough, hatched surface being prepared for a finish. A vertical line indicates the boundary between the rough surface and the finished surface. Labels with arrows point to the rough surface, the finished surface, and the application of the surface finish.

- CLEAN SURF. CONTAMINANT
- ROUGH PR. FINISHING AP.
- APPLY SURF. FINISHING AP.

- CLEAN SURFACE OF ALL DUST, GREASE, OIL AND OTHER CONTAMINANTS
- ROUGHEN PREVIOUS COATING PRIOR TO SURFACE FINISHING APPLICATION
- APPLY SURFACE FINISH COATING SYSTEM. PROTECT SURFACE FROM DAMAGE AND ALLOW FULL CURING TIME

*REFER TO MANUFACTURER'S INSTRUCTIONS FOR THE GLAZING MATERIAL

FOLLOWING TERRA COTTA PATCHING/REPAIRS, CLEAN TERRA COTTA SURFACE OF ALL GREASE, OIL & CONTAMINANTS. ALLOW TO DRY.

ROUGHEN PREVIOUS COATING PRIOR TO PRIMER/GLAZE APPLICATION. MULTIPLE COATS MAY BE NEEDED. REFER TO APPROVED MOCK UP. (ALLOW PROPER CURING TIME BEFORE RE-COATING)

PROTECT SURFACE FROM DAMAGE FOLLOWING APPLICATION

- FOLLOWING TERRA COTTA PATCHING/REPAIRS, CLEAN TERRA COTTA SURFACE OF ALL GREASE, OIL & CONTAMINANTS. ALLOW TO DRY.

- ROUGHEN PREVIOUS COATING PRIOR TO PRIMER/GLAZE APPLICATION. MULTIPLE COATS MAY BE NEEDED. REFER TO APPROVED MOCK UP. (ALLOW PROPER CURING TIME BEFORE RE-COATING)

- PROTECT SURFACE FROM DAMAGE FOLLOWING APPLICATION

IF THE UNIT IS COMPROMISED DURING PATCH WORK, REPLACE UNIT

*REFER TO MANUFACTURER'S INSTRUCTIONS FOR THE PATCHING MATERIAL

ADJACENT STABLE TERRA COTTA SUBSTRATE

CUT THE AREA OUT ROUGHLY UNTIL STABLE HEALTHY SUBSTRATE IS REACHED AND FORM A SQUARE CONNECTION BETWEEN THE PARTS TO BE REPAIRED AND THE PATCH. CUT OUT MUST NOT BE LESS THAN 3 MM. (APPLY ANCHORS FOR LARGER PATCHES PER MANUFACTURER'S RECOMMENDATIONS)

SUBSTRATE MUST BE PREMOISTENED, APPLY PATCHING MATERIAL IN SINGLE LAYER. IN CASE OF APPLICATION OF MORE THAN ONE LAYER IT IS IMPORTANT TO REMOVE THE CEMENT SKIN BETWEEN THE LAYERS. PATCHES MUST BE MOISTENED ONCE A DAY FOR THE CRITICAL HARDENING PERIOD (3-4 DAYS).

PROTECT PATCHED AREA FROM DAMAGE AS PER MANUFACTURER

*REFER TO MANUFACTURER'S INSTRUCTIONS FOR THE PATCHING MATERIAL

— ADJACENT STABLE TERRA COTTA SUBSTRATE

— CUT THE AREA OUT ROUGHLY UNTIL STABLE HEALTHY SUBSTRATE IS REACHED AND FORM A SQUARE CONNECTION BETWEEN THE PARTS TO BE REPAIRED AND THE PATCH. CUT OUT MUST NOT BE LESS THAN 3 MM. (APPLY ANCHORS FOR LARGER PATCHES PER MANUFACTURER'S RECOMMENDATIONS)

— SUBSTRATE MUST BE PREMOISTENED. APPLY PATCHING MATERIAL IN SINGLE LAYER. IN CASE OF APPLICATION OF MORE THAN ONE LAYER IT IS IMPORTANT TO REMOVE THE CEMENT SKIN BETWEEN THE LAYERS. PATCHES MUST BE MOISTENED ONCE A DAY FOR THE CRITICAL HARDENING PERIOD (3-4 DAYS).

—PROTECT PATCHED AREA FROM DAMAGE AS PER
MANUFACTURER

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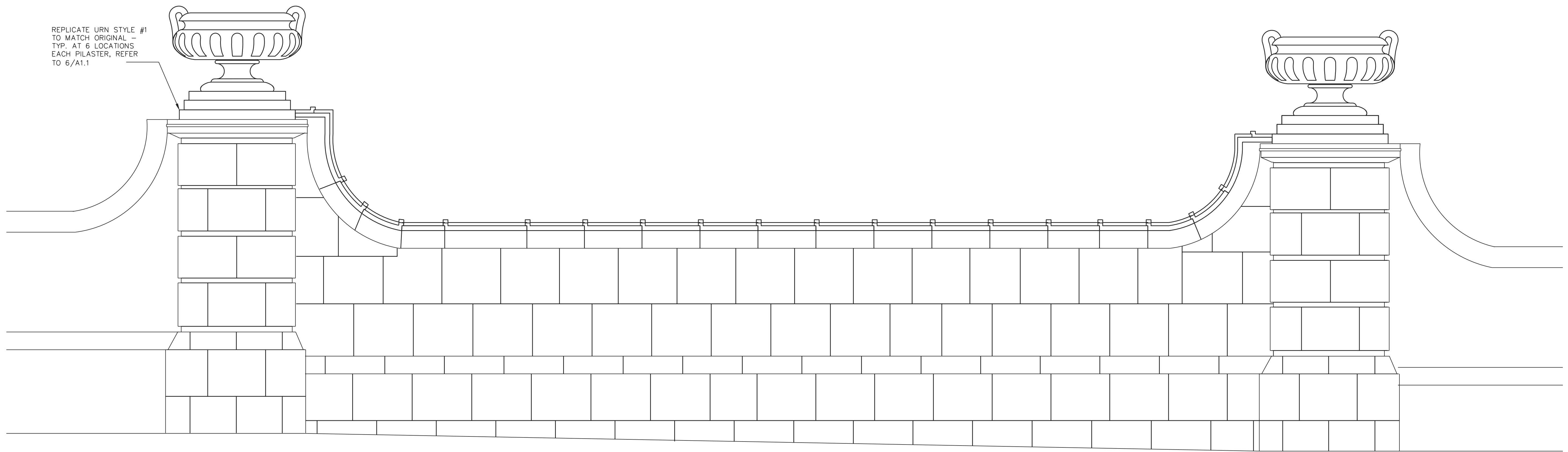
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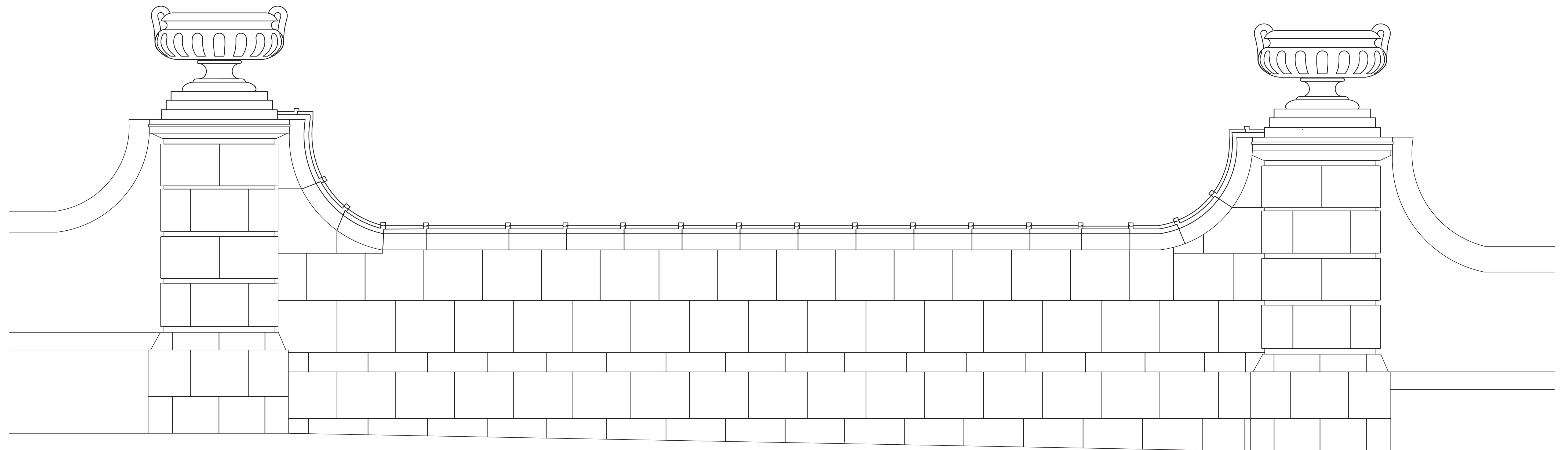
DETAILS

A1.3

REPLICATE URN STYLE #
TO MATCH ORIGINAL -
TYP. AT 6 LOCATIONS
EACH PILASTER, REFER
TO 6/A1.1



2 BACK OF WALL ELEVATION - TYPICAL
3/4" = 1'-0"



1 FRONT OF WALL ELEVATION - TYPICAL
3/4" = 1'-0"

THIS IS A TYPICAL BAY ELEVATION FOR
REFERENCE ONLY

CONTRACTOR TO FIELD VERIFY ALL
CONDITIONS & PROVIDE SHOP DRAWING
FOR NEW TERRA COTTA UNITS

--FOR CONSTRUCTION--
100% CONSTRUCTION DOCUMENTS
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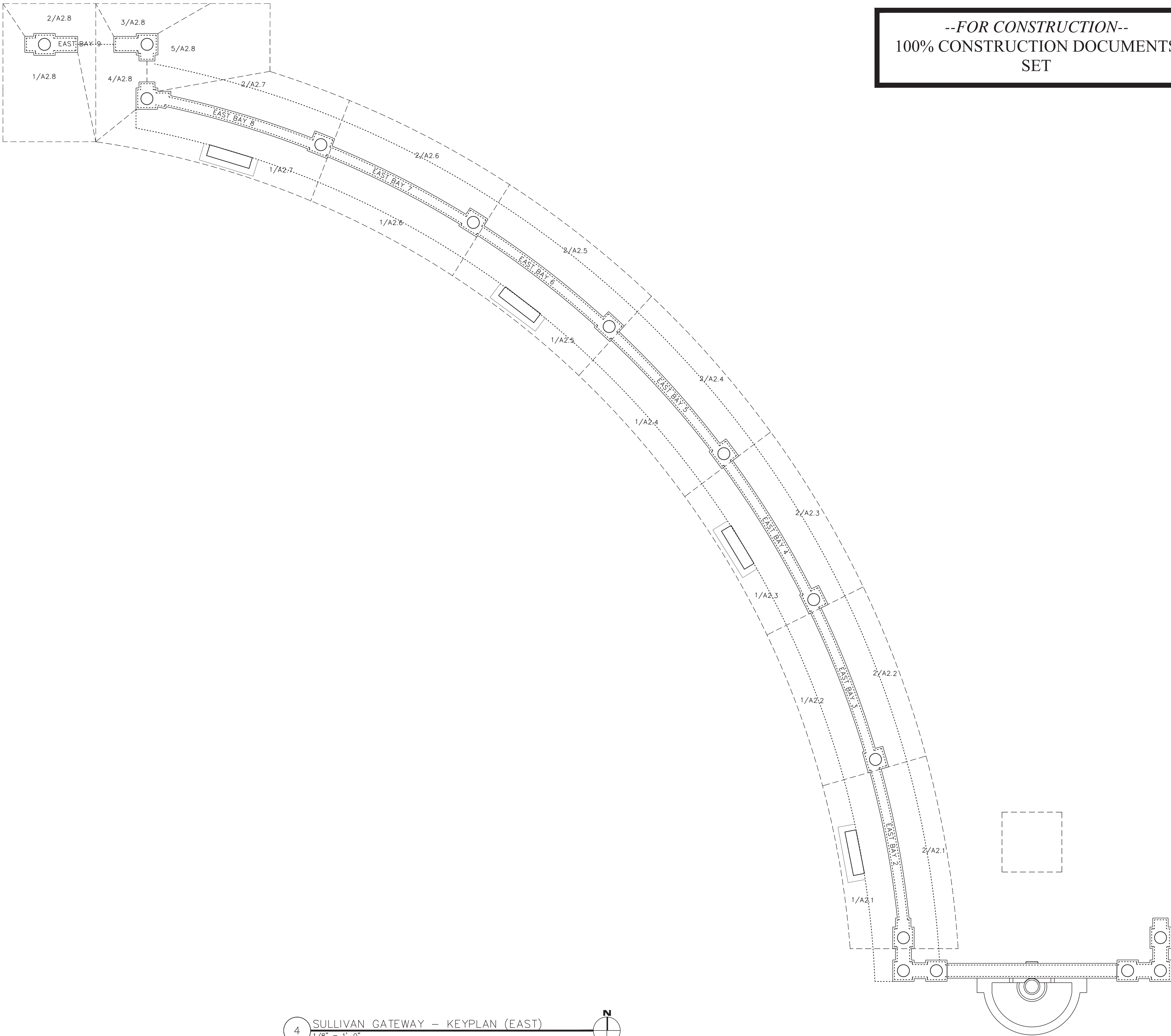
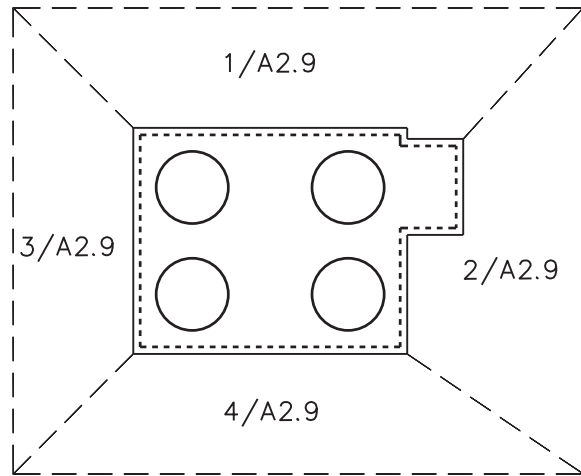
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Issue	PHASE 3 100% CD's
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ENLARGED
WALL ELEVATION

A1.4



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No.	Description	Date

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EAST REPAIR
KEYPLAN

A2.0

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Scale	
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A2.1



1. DRAWINGS HAVE MADE AN ATTEMPT TO THOROUGHLY DEMONSTRATE ALL ANTICIPATED REPAIRS. CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS AND QUANTITIES.
2. ALL CHIPS AND SPALLS SHALL BE RE-GLAZED. NO UNFINISHED TERRA-COTTA SHALL REMAIN.
3. PHOTOS OVERLAP- FIELD VERIFY QUANTITIES
4. PROVIDE SHOP DRAWINGS FOR ALL NEW TERRA COTTA UNITS
5. UNIT WITH NO NUMBER DOES NOT NEED SURFACE REPAIR WORK

3 REPLACE ENTIRE UNIT

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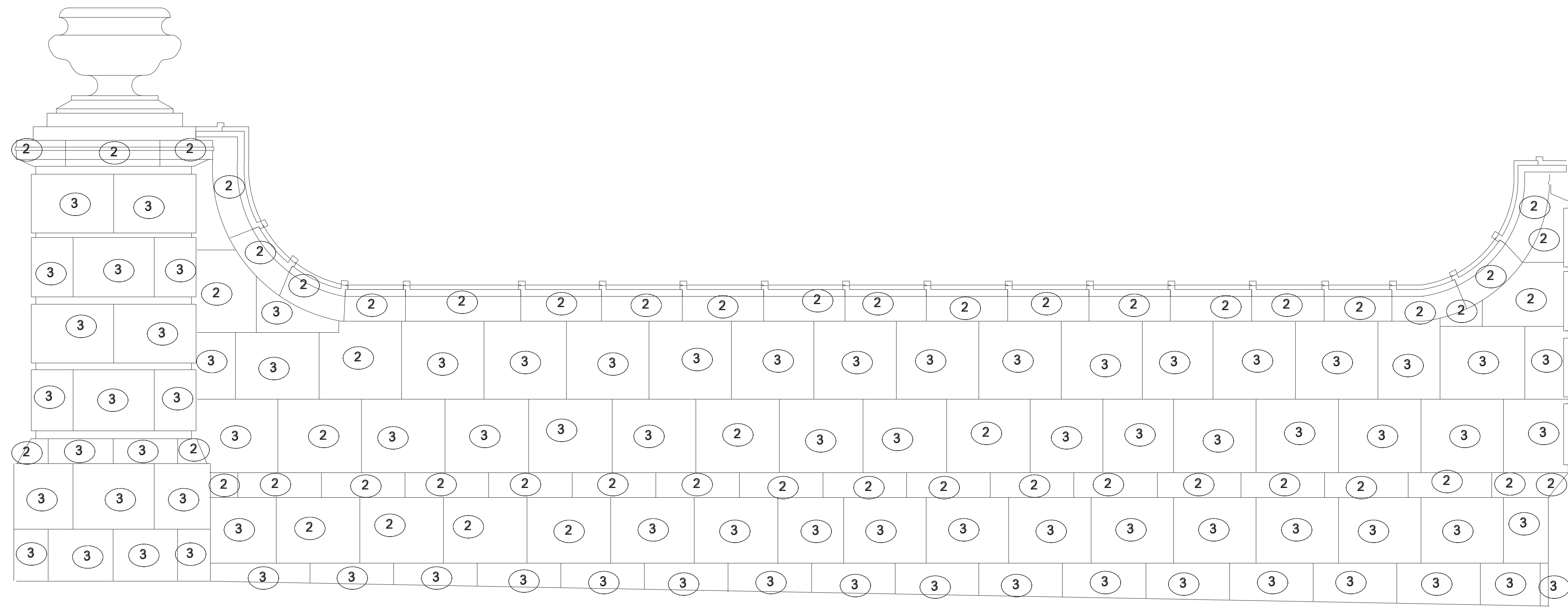
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Colfax Ave & Elizabeth St.

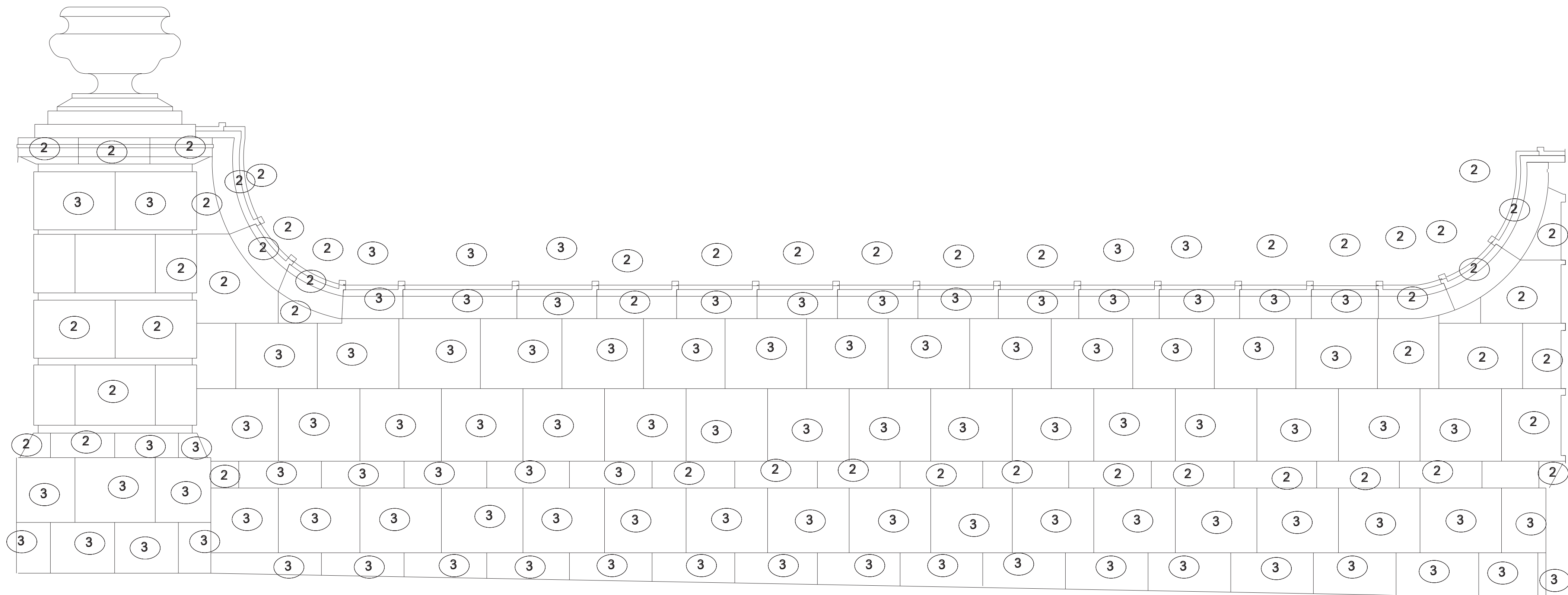
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Checked by EMH

A2.2



2 BACK OF WALL ELEVATION - EAST BAY 3
3/4" = 1'-0"



1 FRONT OF WALL ELEVATION - EAST BAY 3
3/4" = 1'-0"

1. DRAWINGS HAVE MADE AN ATTEMPT TO THOROUGHLY DEMONSTRATE ALL ANTICIPATED REPAIRS. CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS AND QUANTITIES.
2. ALL CHIPS AND SPALLS SHALL BE RE-GLAZED. NO UNFINISHED TERRA-COTTA SHALL REMAIN.
3. PHOTOS OVERLAP- FIELD VERIFY QUANTITIES
4. PROVIDE SHOP DRAWINGS FOR ALL NEW TERRA COTTA UNITS
5. UNIT WITH NO NUMBER DOES NOT NEED SURFACE REPAIR WORK

3 REPLACE ENTIRE UNIT

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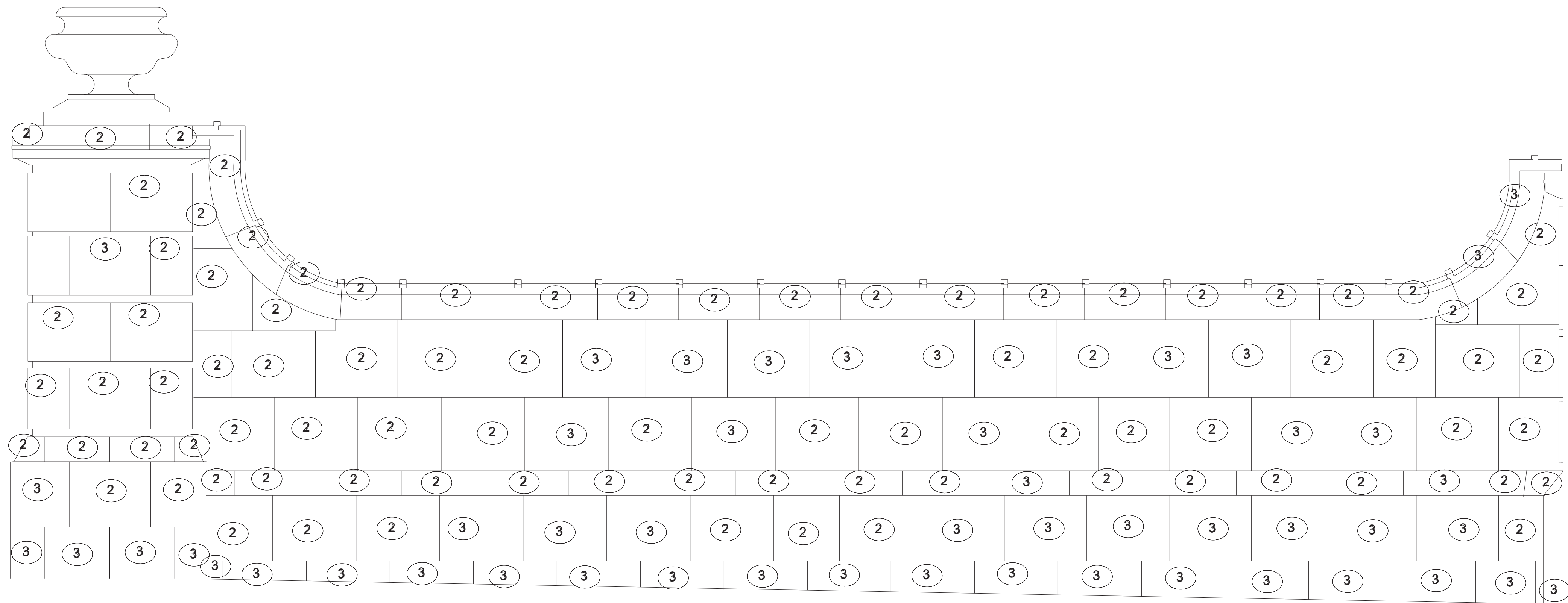
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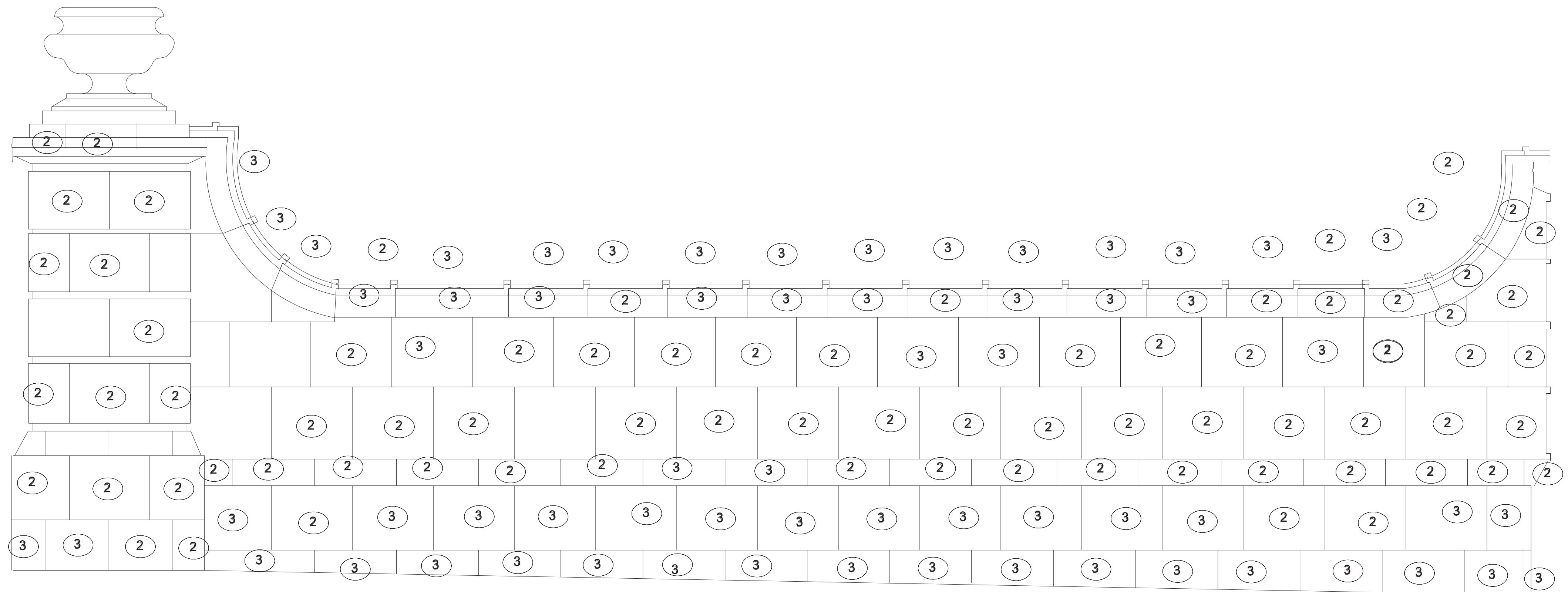
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ENLARGED
WALL ELEVATION

A2.3



2 BACK OF WALL ELEVATION - EAST BAY 4
3/4" = 1'-0"



1 FRONT OF WALL ELEVATION - EAST BAY 4
3/4" = 1'-0"

1. DRAWINGS HAVE MADE AN ATTEMPT TO THOROUGHLY DEMONSTRATE ALL ANTICIPATED REPAIRS. CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS AND QUANTITIES
2. ALL CHIPS AND SPALLS SHALL BE RE-GLAZED. NO UNFINISHED TERRA-COTTA SHALL REMAIN.
3. PHOTOS OVERLAP- FIELD VERIFY QUANTITIES
4. PROVIDE SHOP DRAWINGS FOR ALL NEW TERRA COTTA UNITS
5. UNIT WITH NO NUMBER DOES NOT NEED SURFACE REPAIR WORK

- 1 RESURFACE, REGLAZE
- 2 PATCH, RESURFACE, REGLAZE
- 3 REPLACE ENTIRE UNIT

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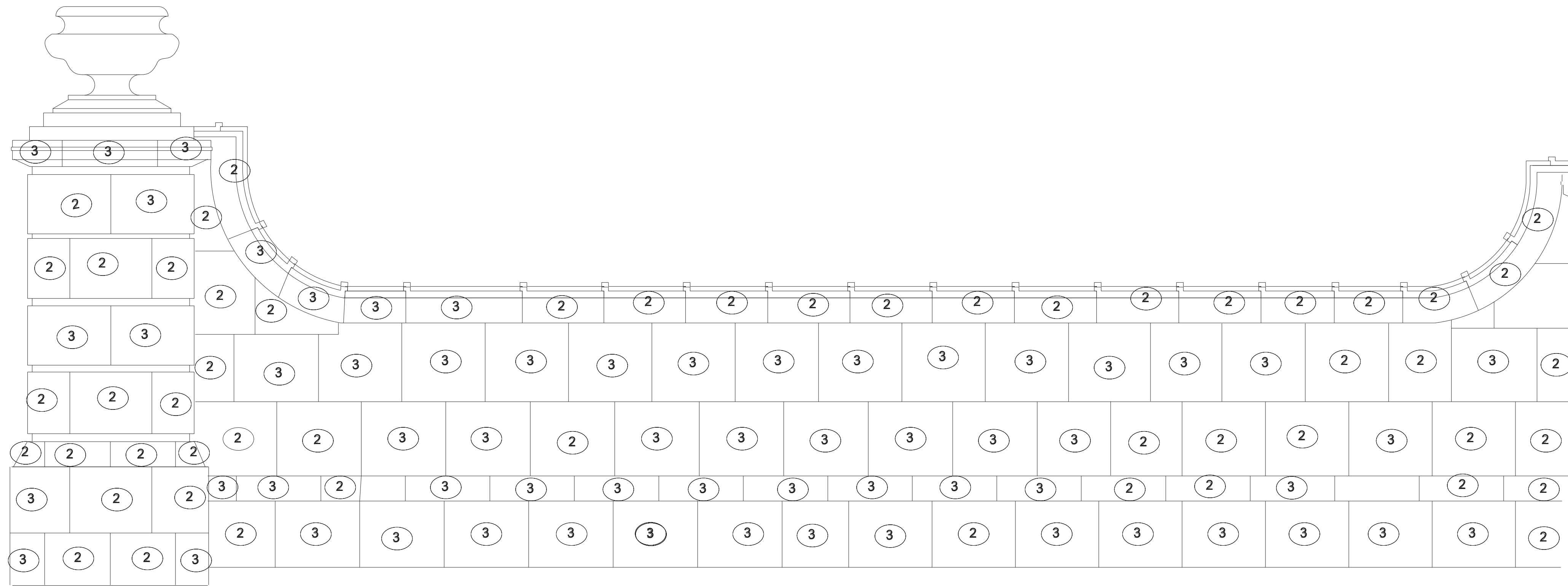
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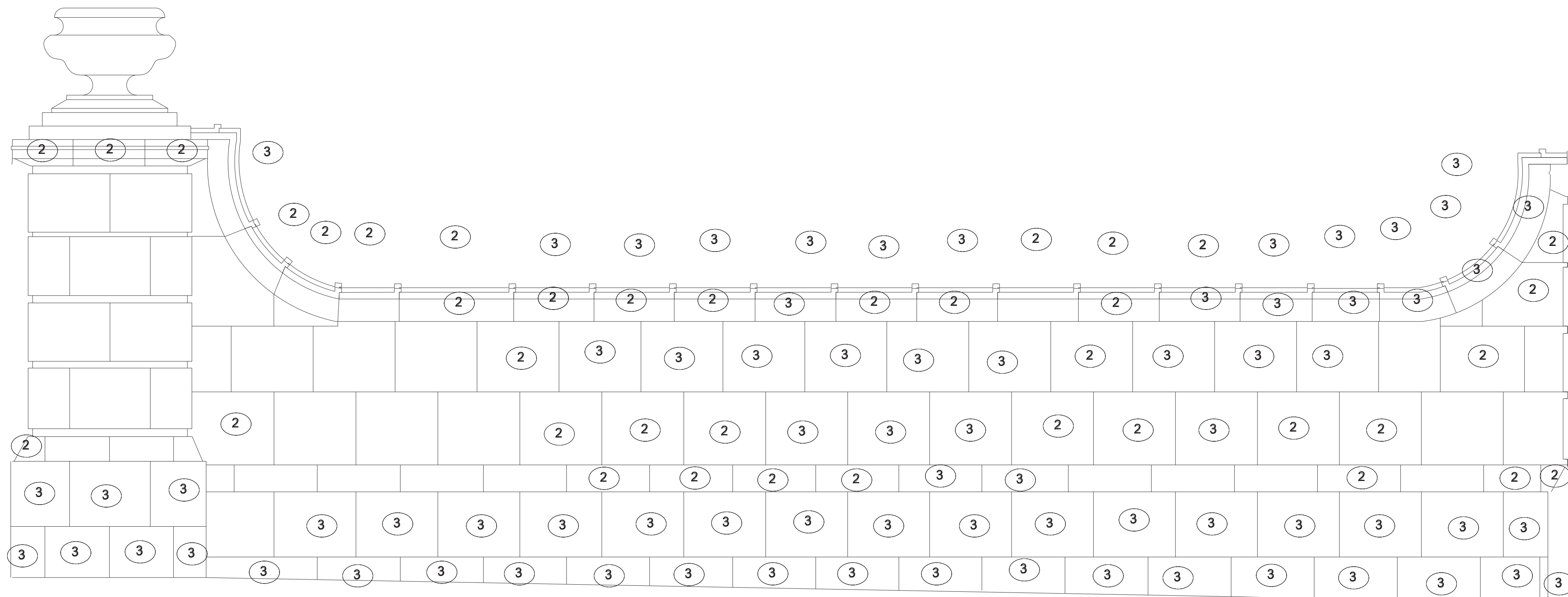
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ENLARGED
WALL ELEVATION

A2.4



2 BACK OF WALL ELEVATION - EAST BAY 5
3/4" = 1'-0"



1 FRONT OF WALL ELEVATION - EAST BAY 5
3/4" = 1'-0"

1. DRAWINGS HAVE MADE AN ATTEMPT TO THOROUGHLY DEMONSTRATE ALL ANTICIPATED REPAIRS. CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS AND QUANTITIES
2. ALL CHIPS AND SPALLS SHALL BE RE-GLAZED. NO UNFINISHED TERRA-COTTA SHALL REMAIN.
3. PHOTOS OVERLAP- FIELD VERIFY QUANTITIES
4. PROVIDE SHOP DRAWINGS FOR ALL NEW TERRA COTTA UNITS
5. UNIT WITH NO NUMBER DOES NOT NEED SURFACE REPAIR WORK

- 1 RESURFACE, REGLAZE
- 2 PATCH, RESURFACE, REGLAZE
- 3 REPLACE ENTIRE UNIT

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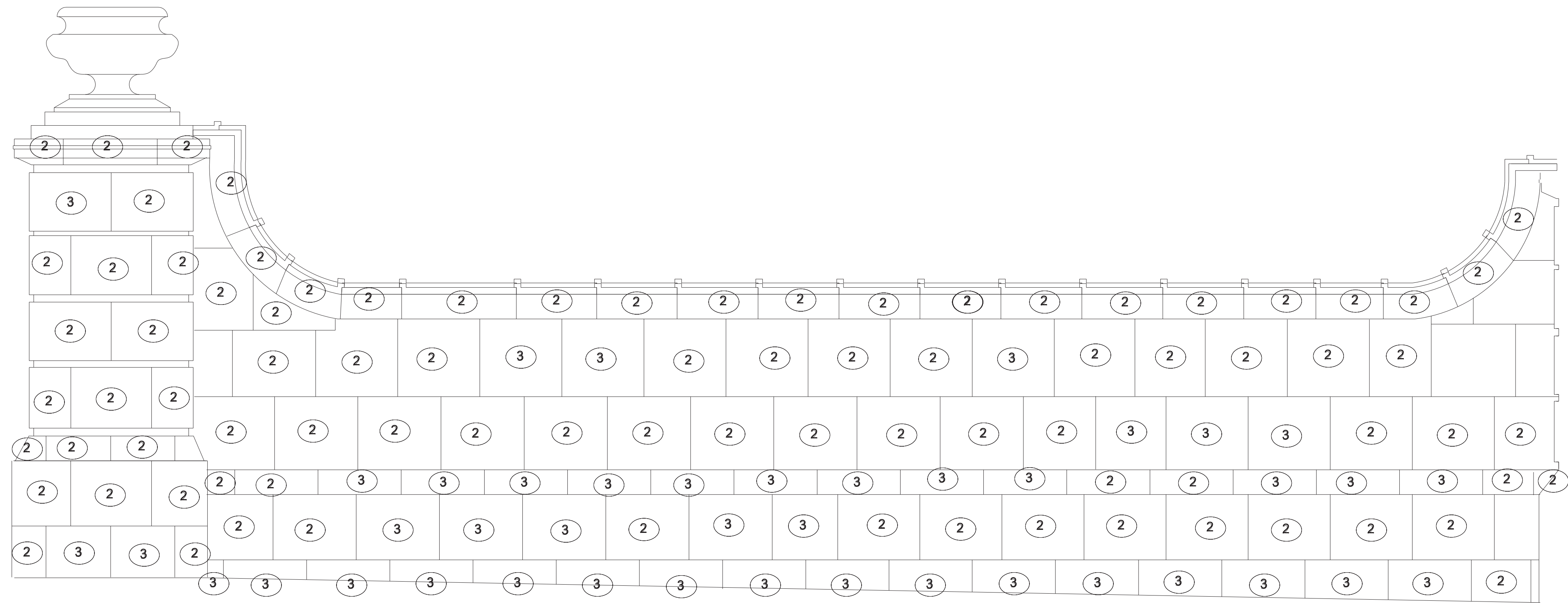
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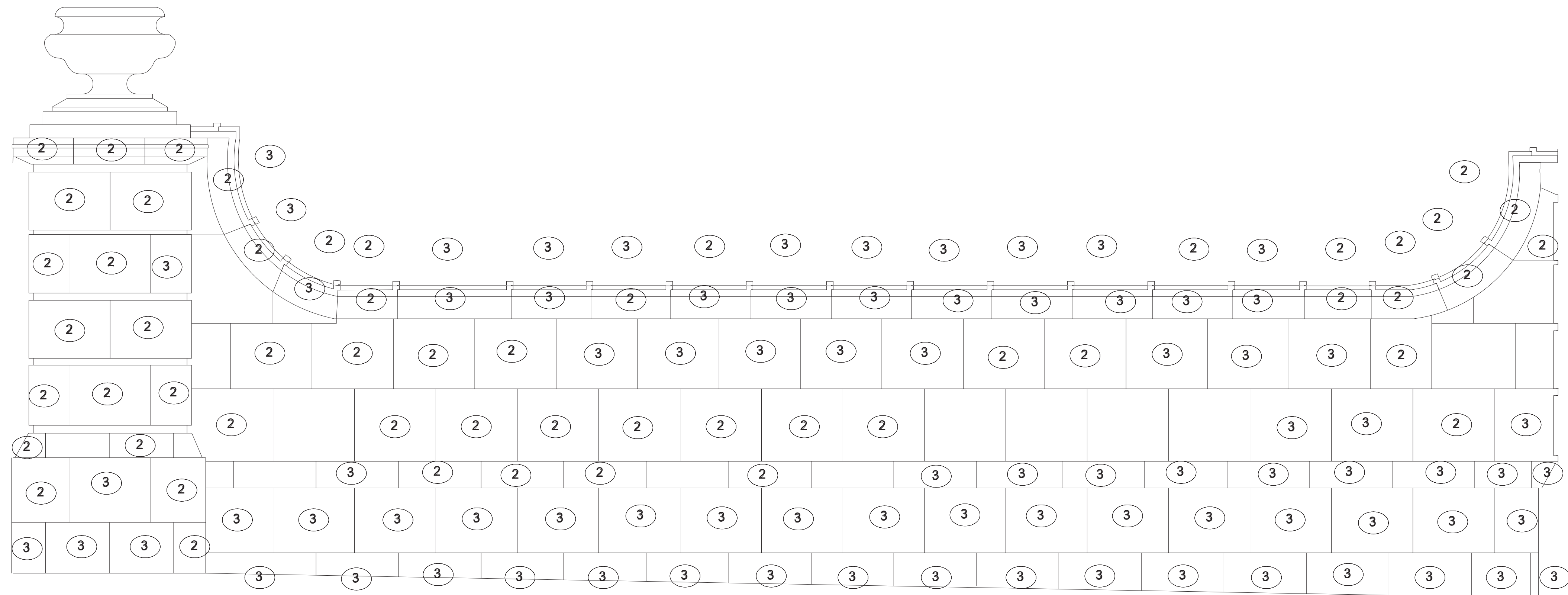
[illegible]

ENLARGED
WALL ELEVATION

A2.5



2 BACK OF WALL ELEVATION - EAST BAY 6
3/4" = 1'-0"



1 FRONT OF WALL ELEVATION - EAST BAY 6
3/4" = 1'-0"

1. DRAWINGS HAVE MADE AN ATTEMPT TO THOROUGHLY DEMONSTRATE ALL ANTICIPATED REPAIRS. CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS AND QUANTITIES.
2. ALL CHIPS AND SPALLS SHALL BE RE-GLAZED. NO UNFINISHED TERRA-COTTA SHALL REMAIN.
3. PHOTOS OVERLAP- FIELD VERIFY QUANTITIES
4. PROVIDE SHOP DRAWINGS FOR ALL NEW TERRA COTTA UNITS
5. UNIT WITH NO NUMBER DOES NOT NEED SURFACE REPAIR WORK

- 1 RESURFACE, REGLAZE
- 2 PATCH, RESURFACE, REGLAZE
- 3 REPLACE ENTIRE UNIT

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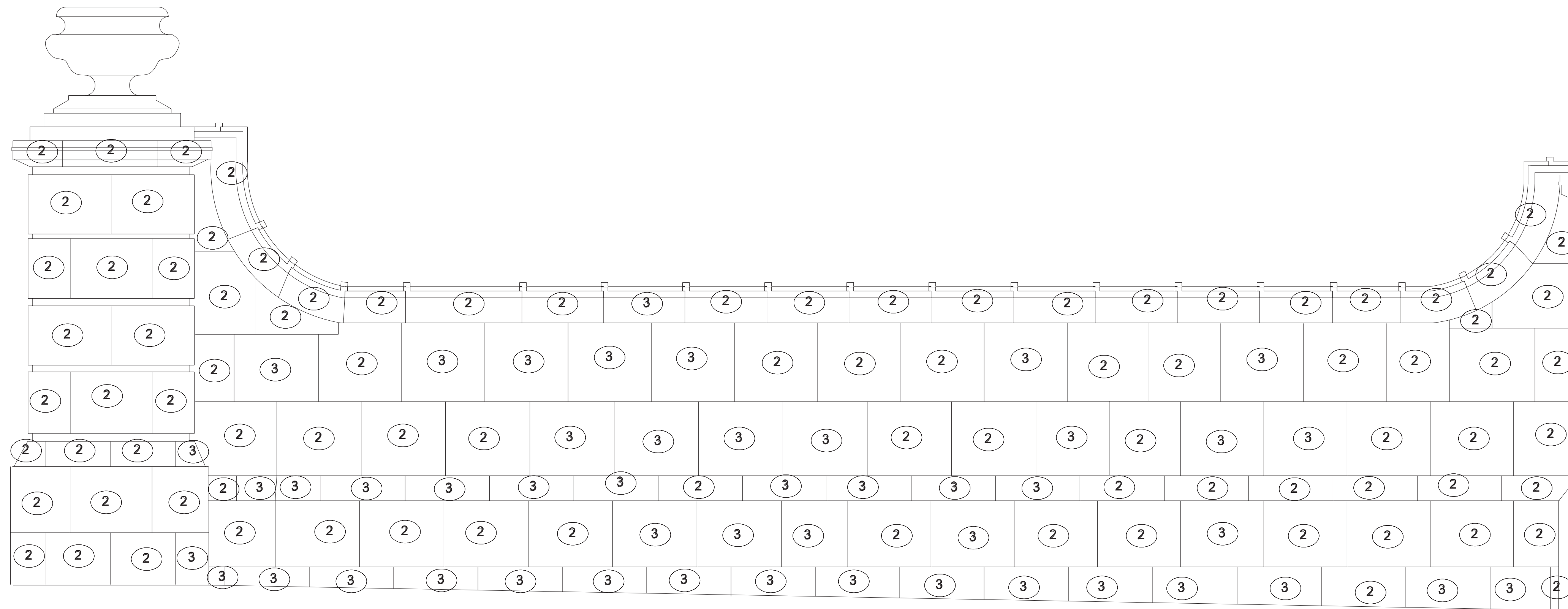
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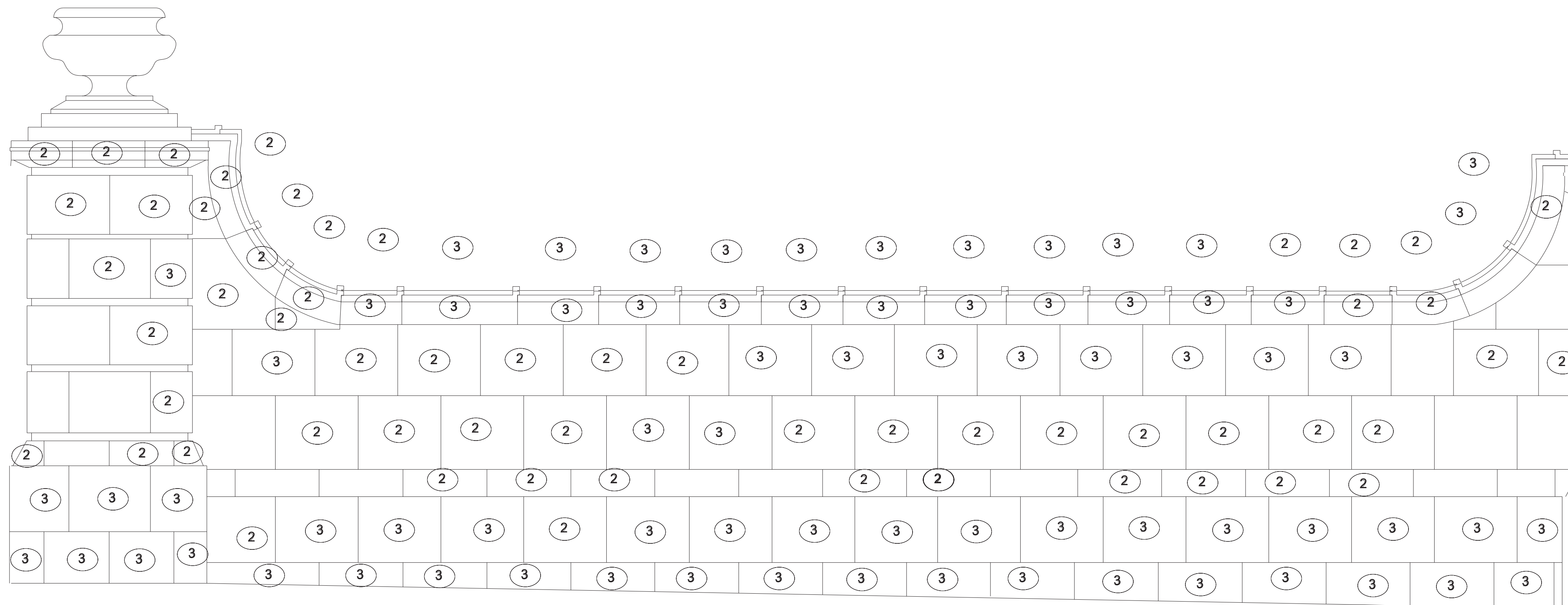
Checked by EMH

ENLARGED
WALL ELEVATION

A2.6



2 BACK OF WALL ELEVATION - EAST BAY 7
3/4" = 1'-0"



1 FRONT OF WALL ELEVATION - EAST BAY 7
3/4" = 1'-0"

1. DRAWINGS HAVE MADE AN ATTEMPT TO THOROUGHLY DEMONSTRATE ALL ANTICIPATED REPAIRS. CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS AND QUANTITIES.
2. ALL CHIPS AND SPALLS SHALL BE RE-GLAZED. NO UNFINISHED TERRA-COTTA SHALL REMAIN.
3. PHOTOS OVERLAP- FIELD VERIFY QUANTITIES
4. PROVIDE SHOP DRAWINGS FOR ALL NEW TERRA COTTA UNITS
5. UNIT WITH NO NUMBER DOES NOT NEED SURFACE REPAIR WORK

3 REPLACE ENTIRE UNIT

--FOR CONSTRUCTION--
100% CONSTRUCTION DOCUMENTS
SET

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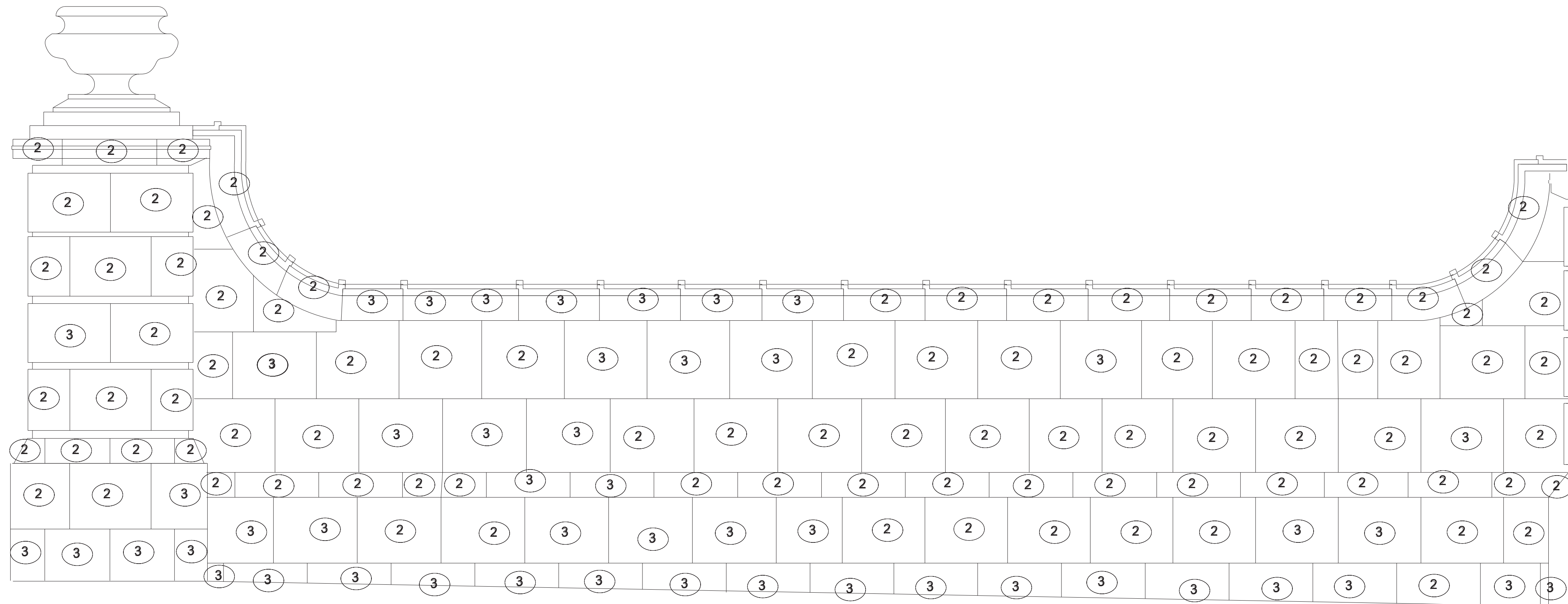
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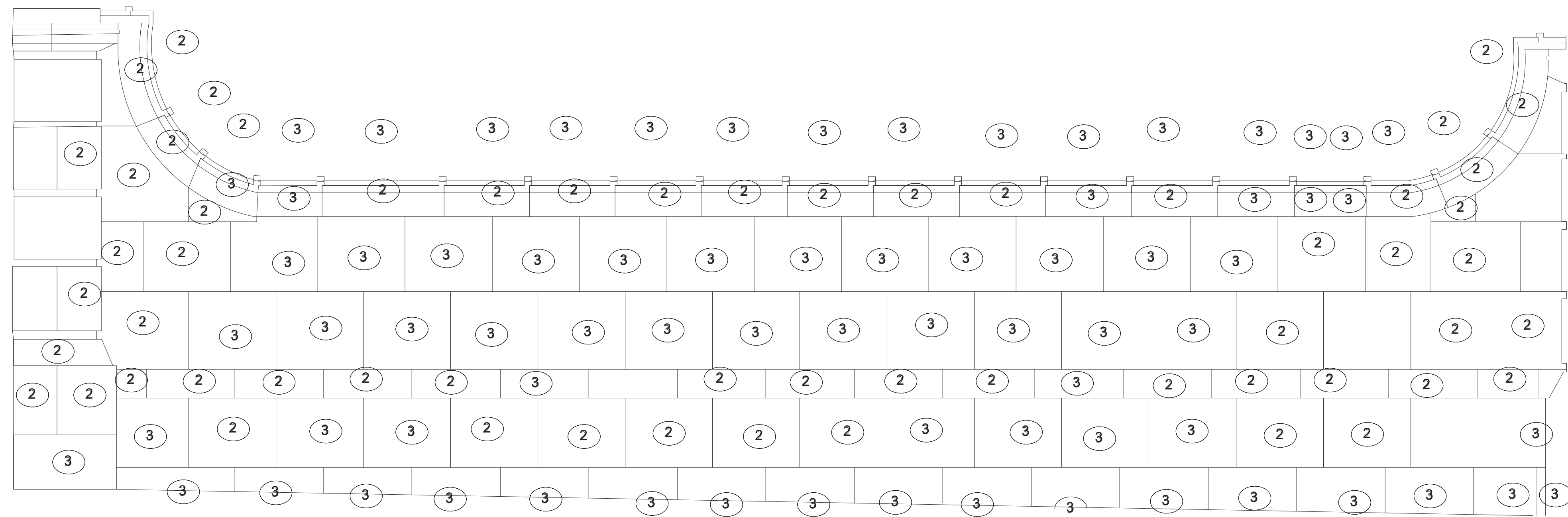
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ENLARGED
WALL ELEVATION

A2.7



2 BACK OF WALL ELEVATION - EAST BAY 8
3/4" = 1'-0"



1 FRONT OF WALL ELEVATION - EAST BAY 8
3/4" = 1'-0"

1. DRAWINGS HAVE MADE AN ATTEMPT TO THOROUGHLY DEMONSTRATE ALL ANTICIPATED REPAIRS. CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS AND QUANTITIES.
2. ALL CHIPS AND SPALLS SHALL BE RE-GLAZED. NO UNFINISHED TERRA-COTTA SHALL REMAIN.
3. PHOTOS OVERLAP- FIELD VERIFY QUANTITIES
4. PROVIDE SHOP DRAWINGS FOR ALL NEW TERRA COTTA UNITS
5. UNIT WITH NO NUMBER DOES NOT NEED SURFACE REPAIR WORK

3 REPLACE ENTIRE UNIT

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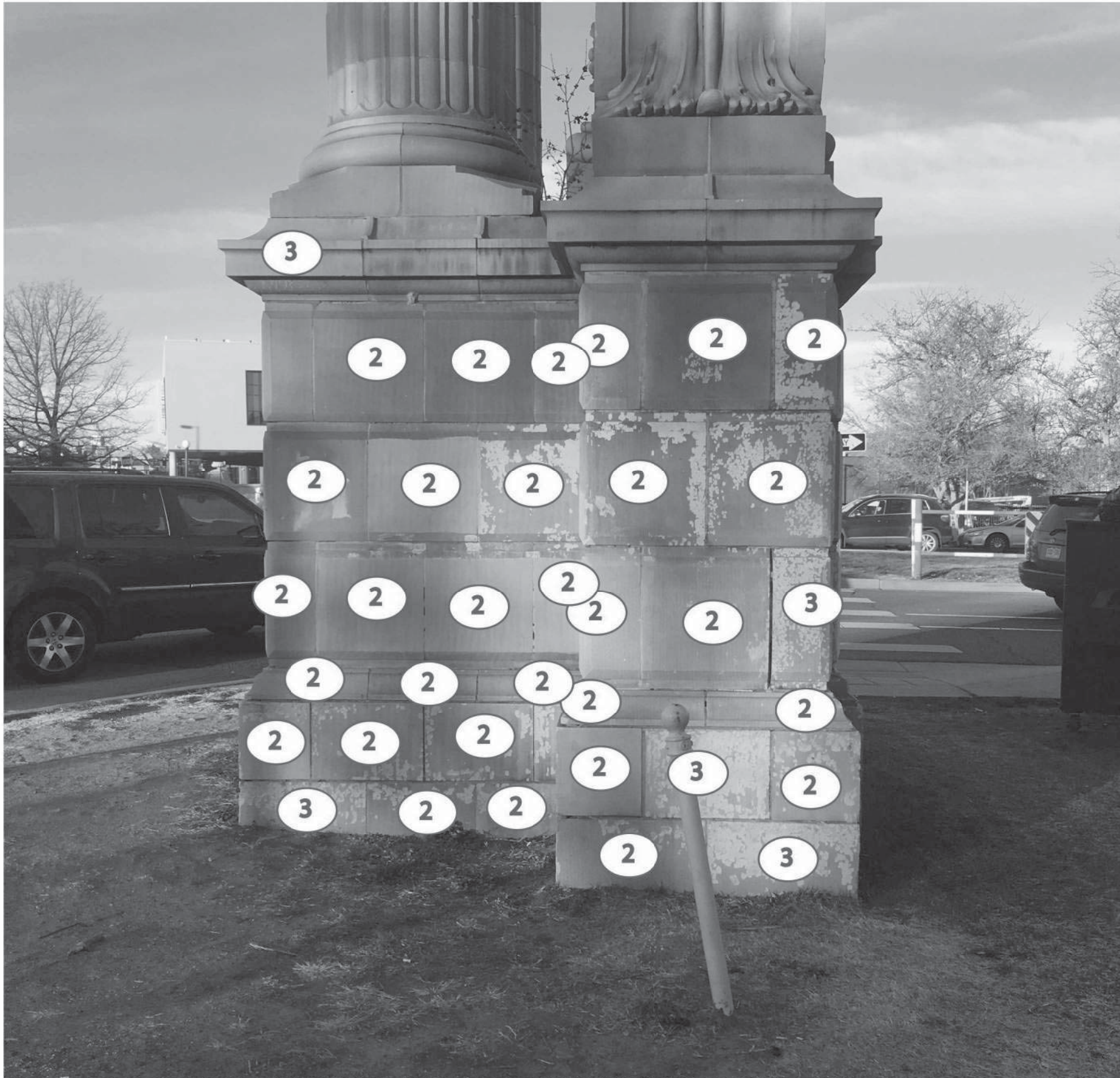
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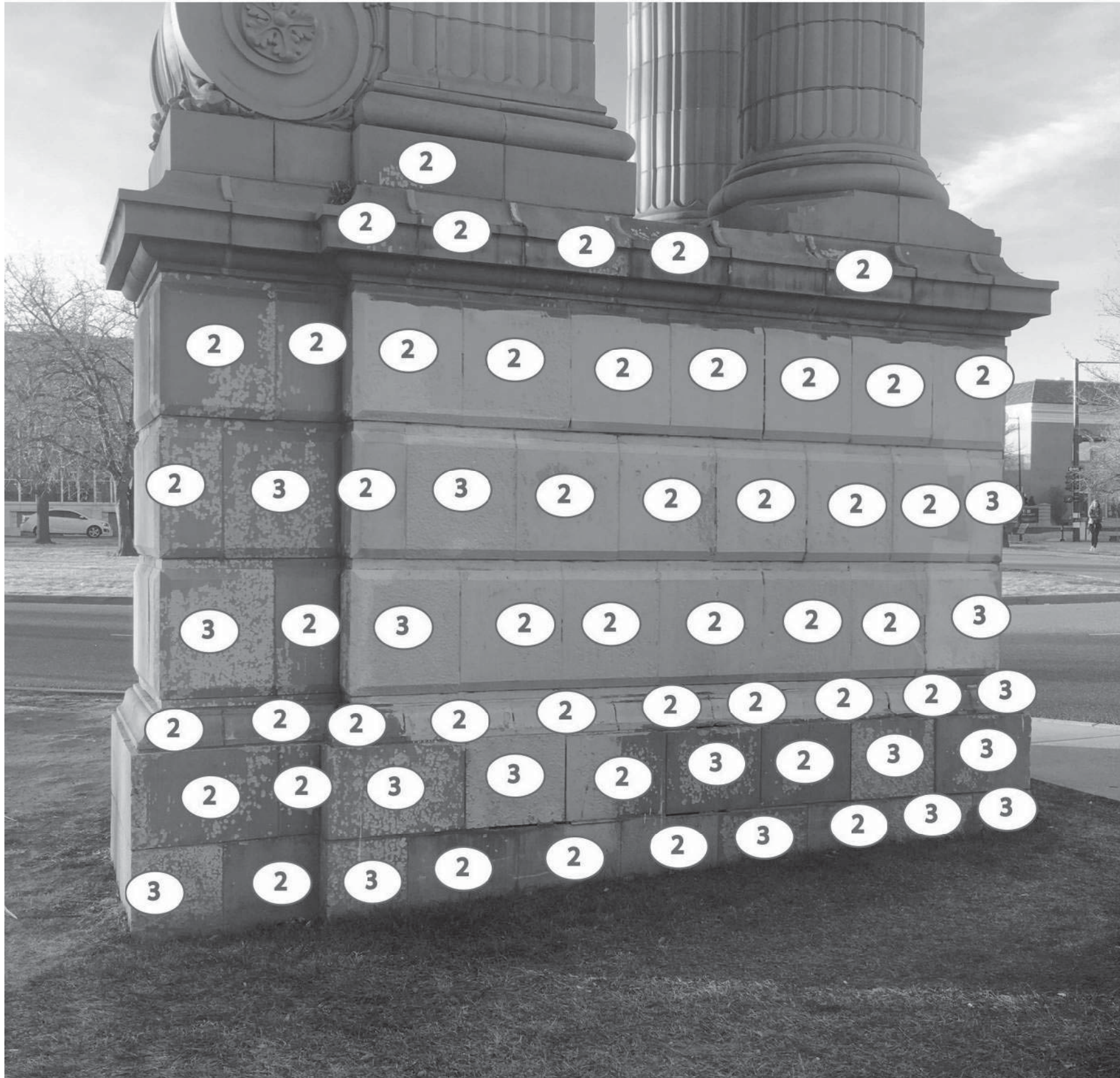
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WALL ELEVATION

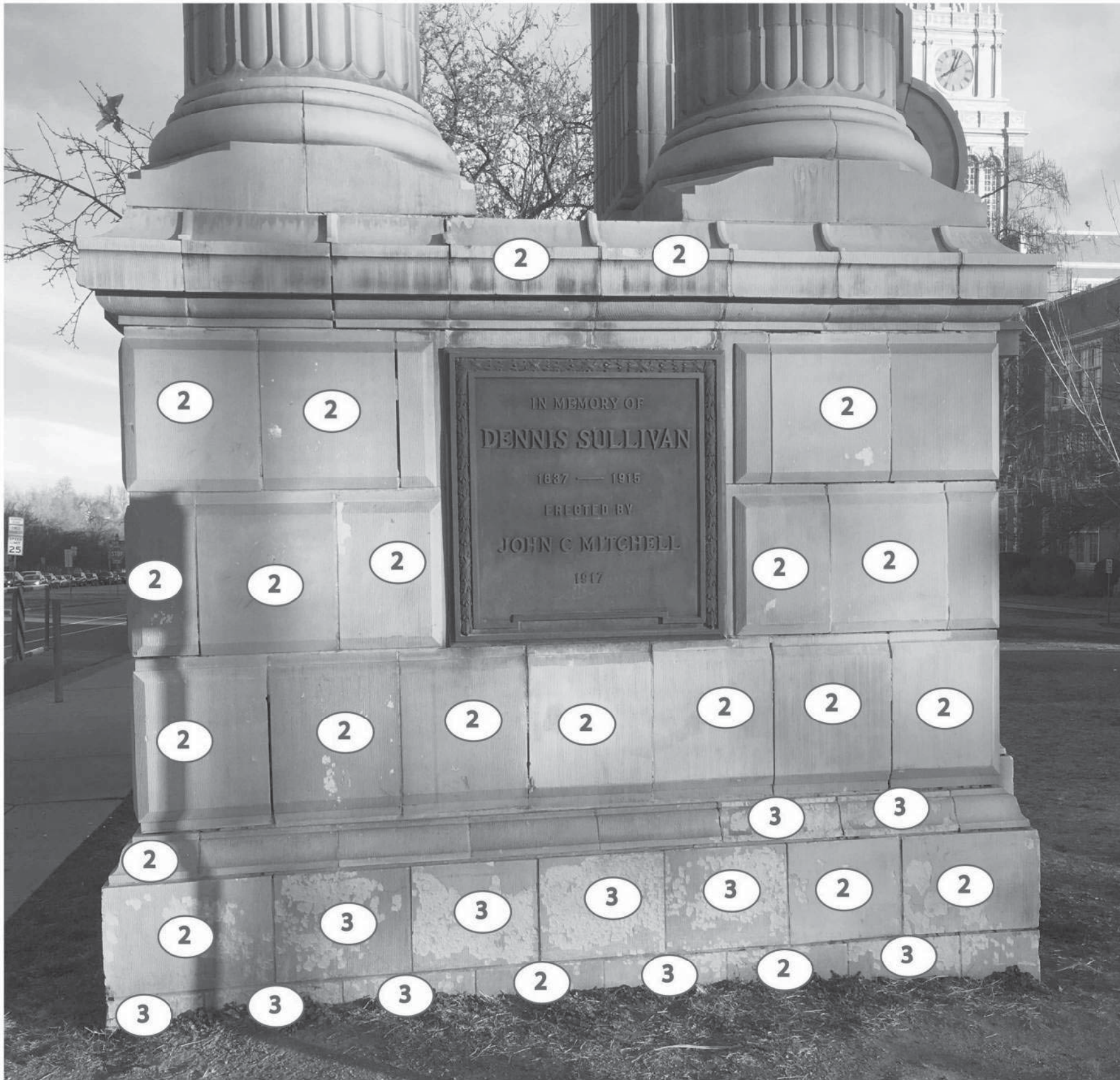
A2.8



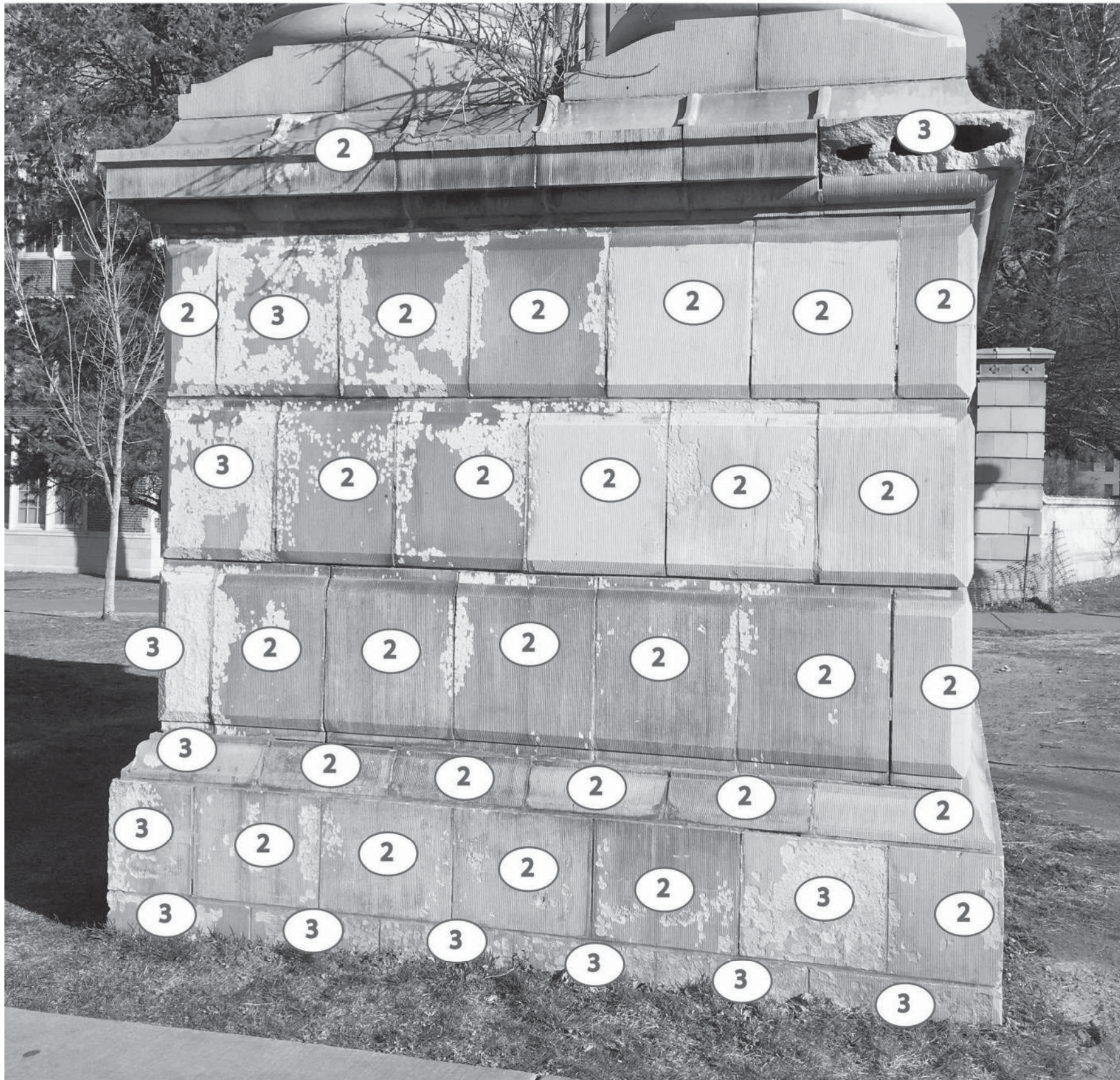
2 STATUE BASE – EAST
NTS



1 STATUE BASE – NORTH
NTS



4 STATUE BASE – SOUTH
NTS



3 STATUE BASE – WEST
NTS

GENERAL NOTES

1. DRAWINGS HAVE MADE AN ATTEMPT TO THOROUGHLY DEMONSTRATE ALL ANTICIPATED REPAIRS. CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS AND QUANTITIES.
2. ALL CHIPS AND SPALLS SHALL BE RE-GLAZED. NO UNFINISHED TERRA-COTTA SHALL REMAIN.
3. PHOTOS OVERLAP- FIELD VERIFY QUANTITIES
4. PROVIDE SHOP DRAWINGS FOR ALL NEW TERRA COTTA UNITS
5. UNIT WITH NO NUMBER DOES NOT NEED SURFACE REPAIR WORK

KEY NOTES (REFER TO A1.3)

- 1 RESURFACE, REGLAZE
- 2 PATCH, RESURFACE, REGLAZE
- 3 REPLACE ENTIRE UNIT

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SULLIVAN GATEWAY
Gateway Rehabilitation
Colfax Ave & Elizabeth St.

No.	Description	Date

Project No.	2017880
Issue	PHASE 3 100% CD's
Date	03/08/2018
Drawn by	KAC
Checked by	EMH
Scale	

ENLARGED
WALL ELEVATION

A2.9

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Gateway Rehabilitation

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Project No.	2017880
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Date	03/08/2018
Drawn by	EH
Checked by	RS
Scale	1:20

L2.0



- ■ ■ ■ ■ PHASE 3 LIMIT OF WORK

 STA-LOK PAVING

CONCRETE PAVING
W/ SCORE LINE

EJ EXPANSION JOINT

 CONCRETE MOWBAND

ALIGNMENT NOTES:

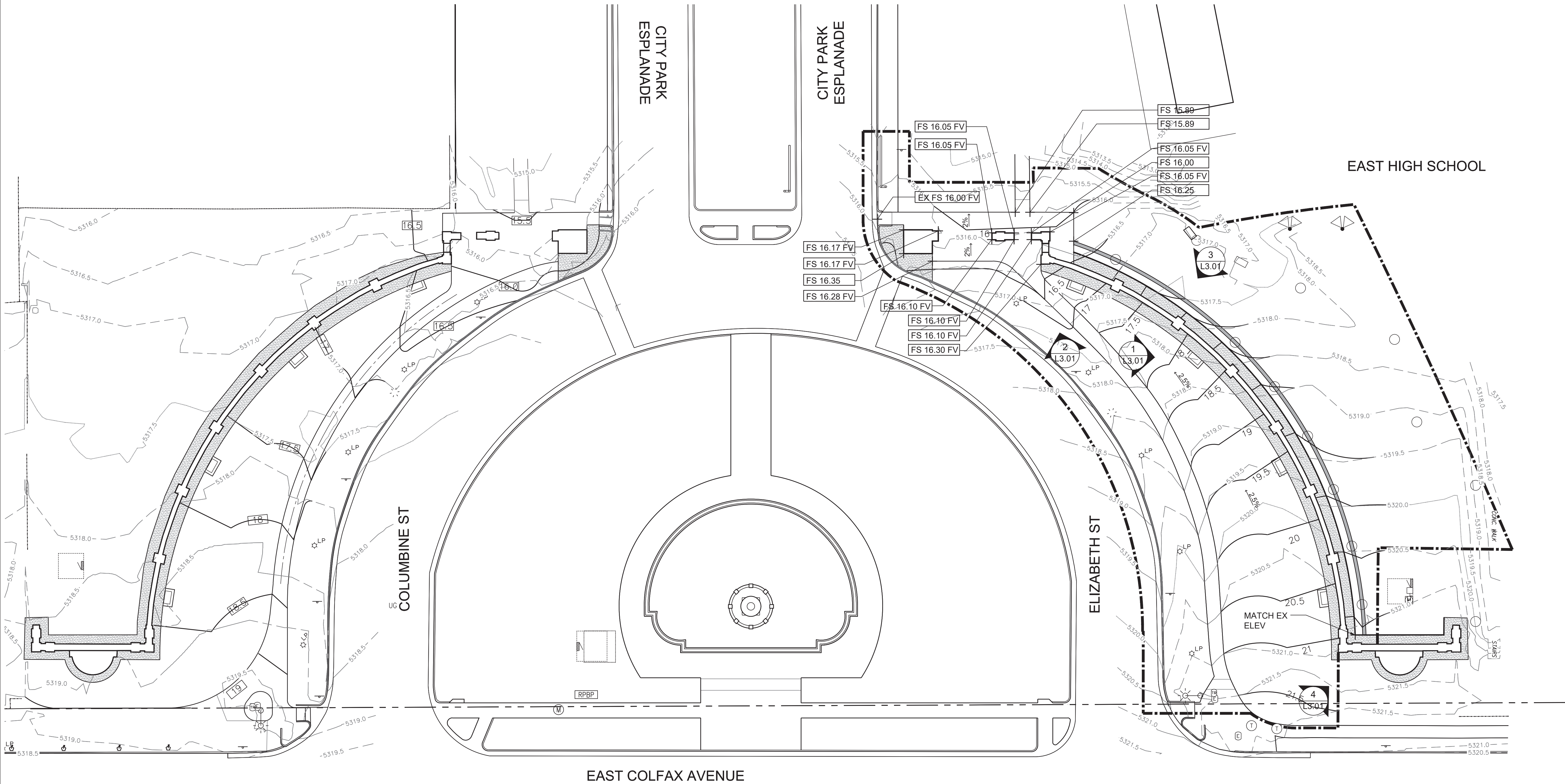
- ① ALIGN SCORE JOINT WITH FACE OF MONUMENT, TYPE
- ② ALIGN SCORE JOINT / EDGE OF WALK WITH ACCESSIBLE RAMP
- ③ ALIGN SCORE JOINT WITH SIDEWALK
- ④ SAWCUT AT NEAREST JOINT
- ⑤ ALIGN EDGE OF STA-LOK WITH MONUMENT EDGE

LAYOUT AND MATERIALS NOTES:

1. ALL SITE IMPROVEMENTS SHALL BE FIELD SURVEYED AND STAKED BY CONTRACTOR. RECEIVE OWNER OR LANDSCAPE ARCHITECT APPROVAL OF STAKED LOCATIONS OF IMPROVEMENTS PRIOR TO INSTALLATION START -UP.
2. RECEIVE OWNER OR LANDSCAPE ARCHITECT APPROVAL OF FINAL STAKING BY CONTRACTOR OF ALL CONCRETE FLATWORK PRIOR TO CONSTRUCTION AND ALL FORM WORK PRIOR TO POURING.
3. ALL DIMENSIONS SHALL BE FIELD VERIFIED BY CONTRACTOR PRIOR TO CONSTRUCTION. ANY DEVIATION FROM THESE PLANS MUST BE APPROVED BY OWNER OR LANDSCAPE ARCHITECT PRIOR TO CONSTRUCTION.
4. PRIOR TO EXCAVATION, UNDERGROUND UTILITIES SHALL BE FIELD VERIFIED (SEE SPECS).
5. SEE SITE SURVEY FOR ADDITIONAL CONTROL POINTS, MONUMENTS AND BENCHMARKS.
6. ALL CONTROL JOINTS SHALL BE SPACED AS INDICATED ON THE DRAWINGS AND DETAILS. EXPANSION JOINTS SHALL BE PLACED AS INDICATED ON THE DRAWINGS OR EVERY 80'. CONTRACTOR SHALL LAYOUT ALL CONTROL JOINTS AND EXPANSION JOINTS IN THE FIELD FOR APPROVAL BY OWNER OR LANDSCAPE ARCHITECT.



A horizontal number line with tick marks at 0, 20, and 40. The segment between 20 and 40 is shaded with vertical lines.



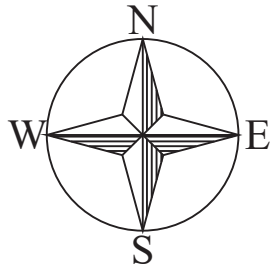
LEGEND:

- PHASE 3 LIMIT OF WORK
- PROPOSED CONTOUR LINE, CONTOUR INTERVAL IS 6"
- CONCRETE MOWBAND

GRADING NOTES:

- SURVEY INFORMATION PROVIDED BY CITY OF DENVER. CONTRACTOR SHALL FIELD VERIFY EXISTING ELEVATIONS AND IS RESPONSIBLE FOR REPORTING ANY DISCREPANCIES ON THE PLANS IMMEDIATELY TO THE ATTENTION OF THE PROJECT MANAGER.
- UTILITIES SHOWN ARE FOR INFORMATION ONLY. PRIOR TO EXCAVATION CONTRACTOR SHALL FIELD VERIFY AND PROTECT ALL UTILITIES. CONTRACTOR SHALL RESTORE ANY DAMAGED UTILITIES TO THEIR ORIGINAL STATE.
- ALL AREAS DISTURBED BY CONSTRUCTION OPERATIONS SHALL BE PREPARED AND SEEDED AS DIRECTED.
- ALL TOPSOIL WHERE PHYSICALLY PRACTICABLE, SHALL BE SALVAGED AND NO TOPSOIL SHALL BE REMOVED FROM THE SITE EXCEPT AS SET FORTH IN THE APPROVED PLANS. TOPSOIL AND OVERBURDEN SHALL BE SEGREGATED AND STOCKPILED SEPARATELY. ALL STOCKPILES SHALL REMAIN WEED FREE. TOPSOIL AND OVERBURDEN SHALL BE REDISTRIBUTED WITHIN THE GRADED AREA AFTER ROUGH GRADING TO PROVIDE A SUITABLE BASE FOR AREAS THAT WILL BE SEEDED AND PLANTED. RUNOFF FROM THE STOCKPILED AREA SHALL BE CONTROLLED TO PREVENT EROSION AND RESULTING SEDIMENTATION OF RUNOFF WATER.
- CONTRACTOR SHALL USE WATER SPRINKLING AND OTHER SUITABLE METHODS TO LIMIT DUST AND DIRT SCATTERING WHEN REQUESTED BY OWNER. DO NOT USE WATER WHEN IT MAY CREATE HAZARDOUS CONDITIONS SUCH AS ICING, FLOODING OR RUNOFF POLLUTION.
- CONTRACTOR SHALL FIELD VERIFY SITE CONDITIONS AND BASE BID ON ACTUAL CONDITIONS AND MEASUREMENTS. POSITIVE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES.
- SPOT ELEVATIONS SHALL TAKE PRECEDENCE OVER CONTOURS.
- CONTRACTOR SHALL PROVIDE SMOOTH FINISH GRADE FREE OF RUTS, DEPRESSIONS AND IRREGULARITIES.
- ALL PAVING SHALL BE GRADED TO ENSURE POSITIVE DRAINAGE. FINISH LANDSCAPE ADJACENT TO PAVEMENT SHALL BE 1" BELOW TOP OF PAVEMENT.
- CONTRACTOR SHALL USE CAUTION WHEN GRADING AROUND EXISTING TREES. DAMAGED TREES WILL BE REPLACED TO THE SATISFACTION OF THE PROJECT MANAGER. LARGE EQUIPMENT SHALL NOT BE ALLOWED WITHIN THE DRIPLINE OF EXISTING TREES.
- ALL PAVING AND FINISH GRADE ADJACENT TO WALLS AND MONUMENTS SHALL BE AT THE BOTTOM ELEVATION OF

THE TERRACOTTA WITH NO EXPOSED FOOTINGS. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING BOTTOM ELEVATION OF TERRACOTTA AND PROVIDING POSITIVE DRAINAGE AWAY FROM MONUMENTS AND WALLS. CONTRACTOR SHALL NOTIFY LANDSCAPE ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES.



1 GRADING PLAN



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SULLIVAN GATEWAY
Gateway Rehabilitation
Colfax Ave & Elizabeth St.

No.	Description	Date

Project No.	2017880
Issue	PHASE 3 100% CDs
Date	03/08/2018
Drawn by	EH
Checked by	RS
Scale	1:20

GRADING PLAN

L3.0



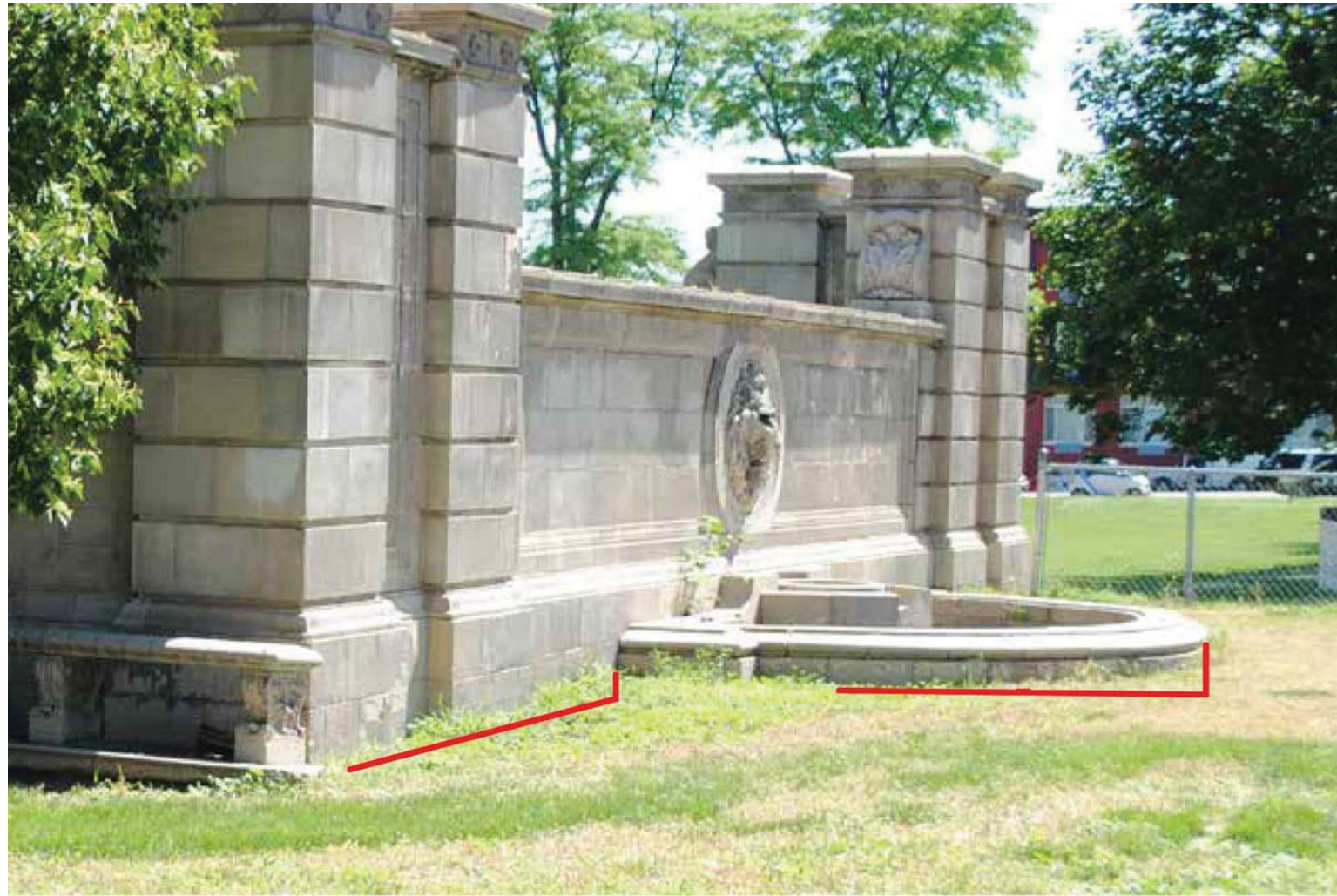
1 EAST WALL, LOOKING SOUTHEAST



2 EAST WALL, LOOKING NORTHWEST



3 EAST WALL, LOOKING SOUTHWEST



4 EAST FOUNTAIN, LOOKING NORTHEAST



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Project No.	2017880
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Issue	PHASE 3 100% CDs
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Drawn by EH

Checked by	RS
Scale	

GRADING IMAGES

L3.1

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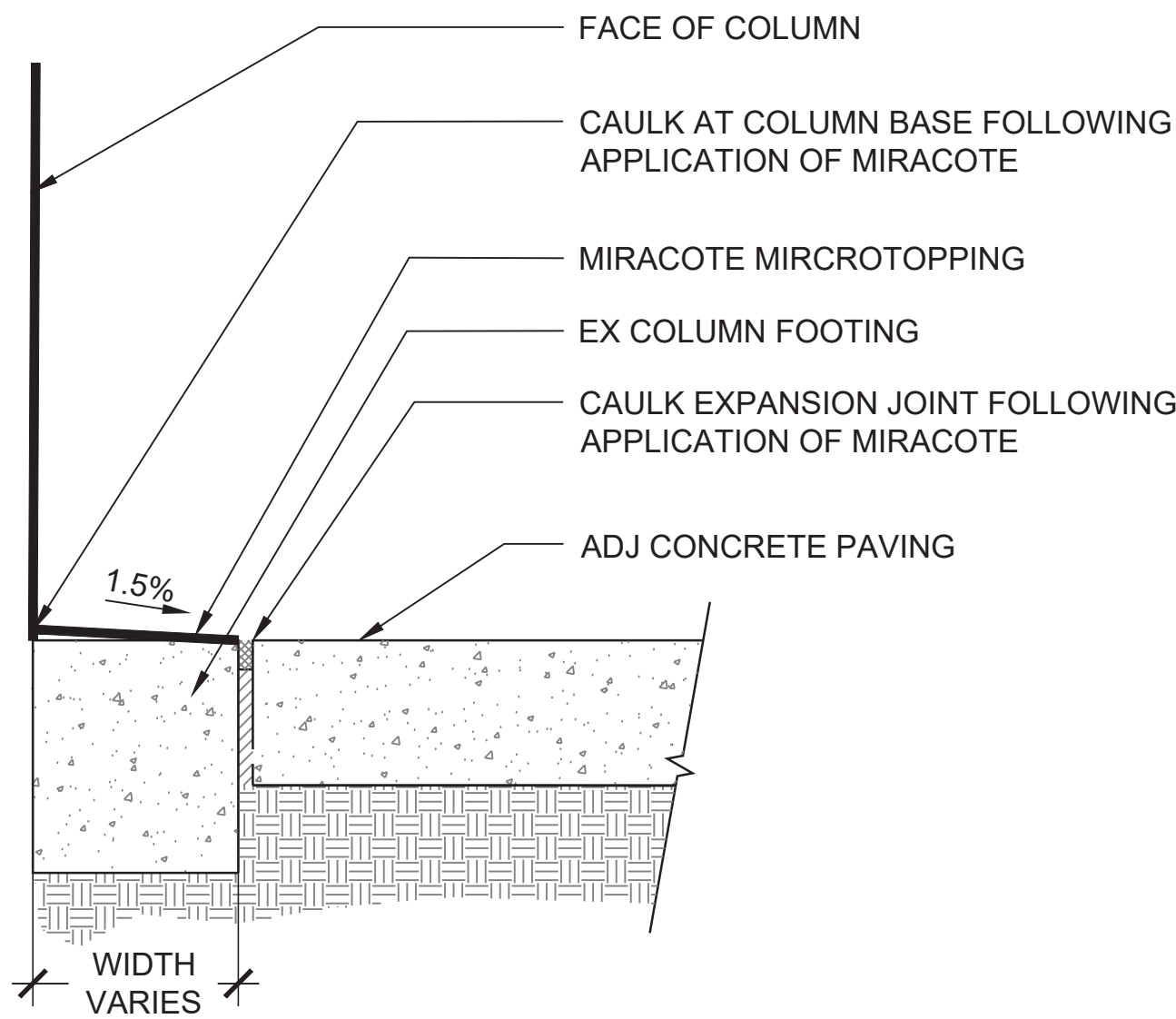
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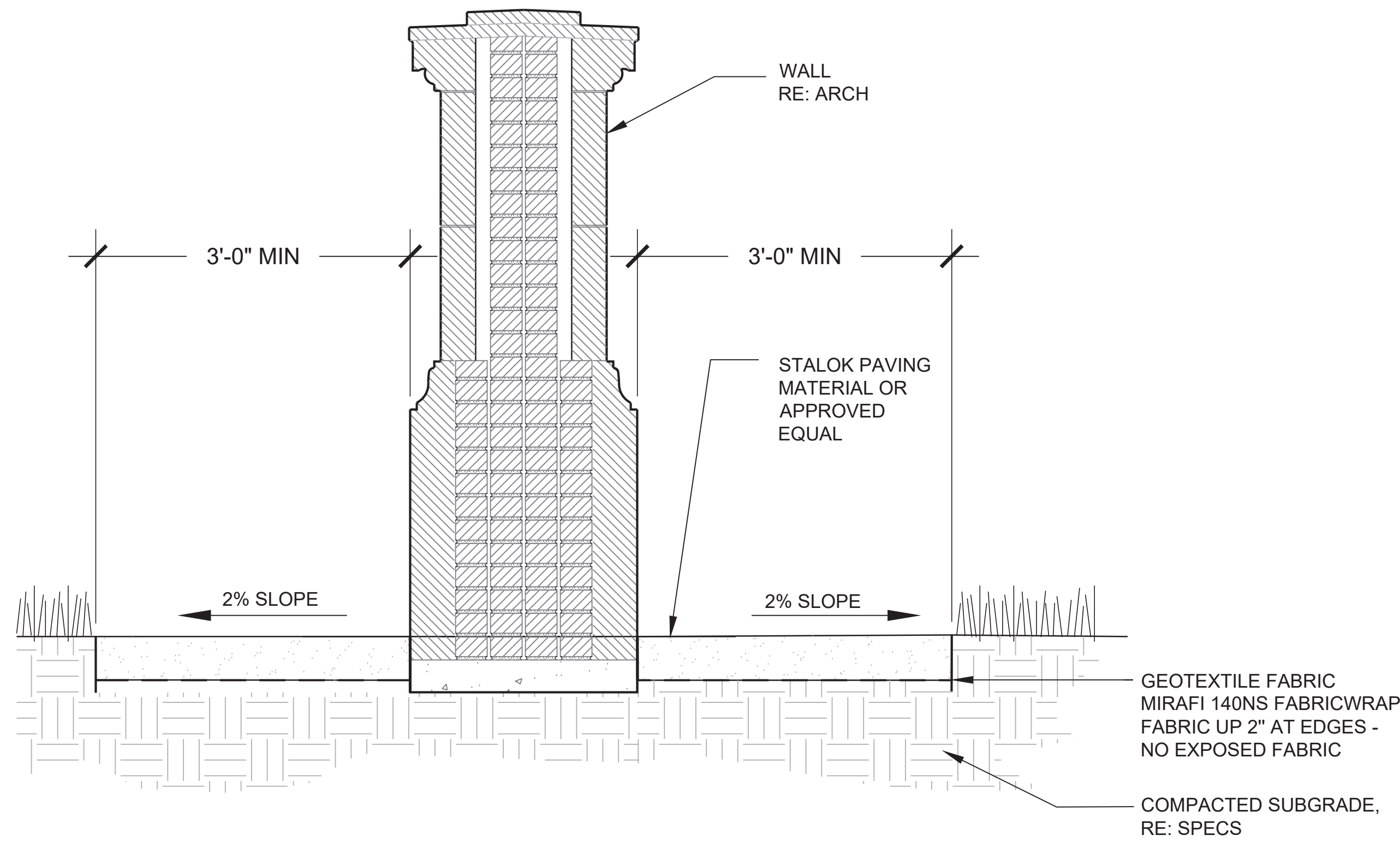
L4.0

3 CONCRETE MOWBAND

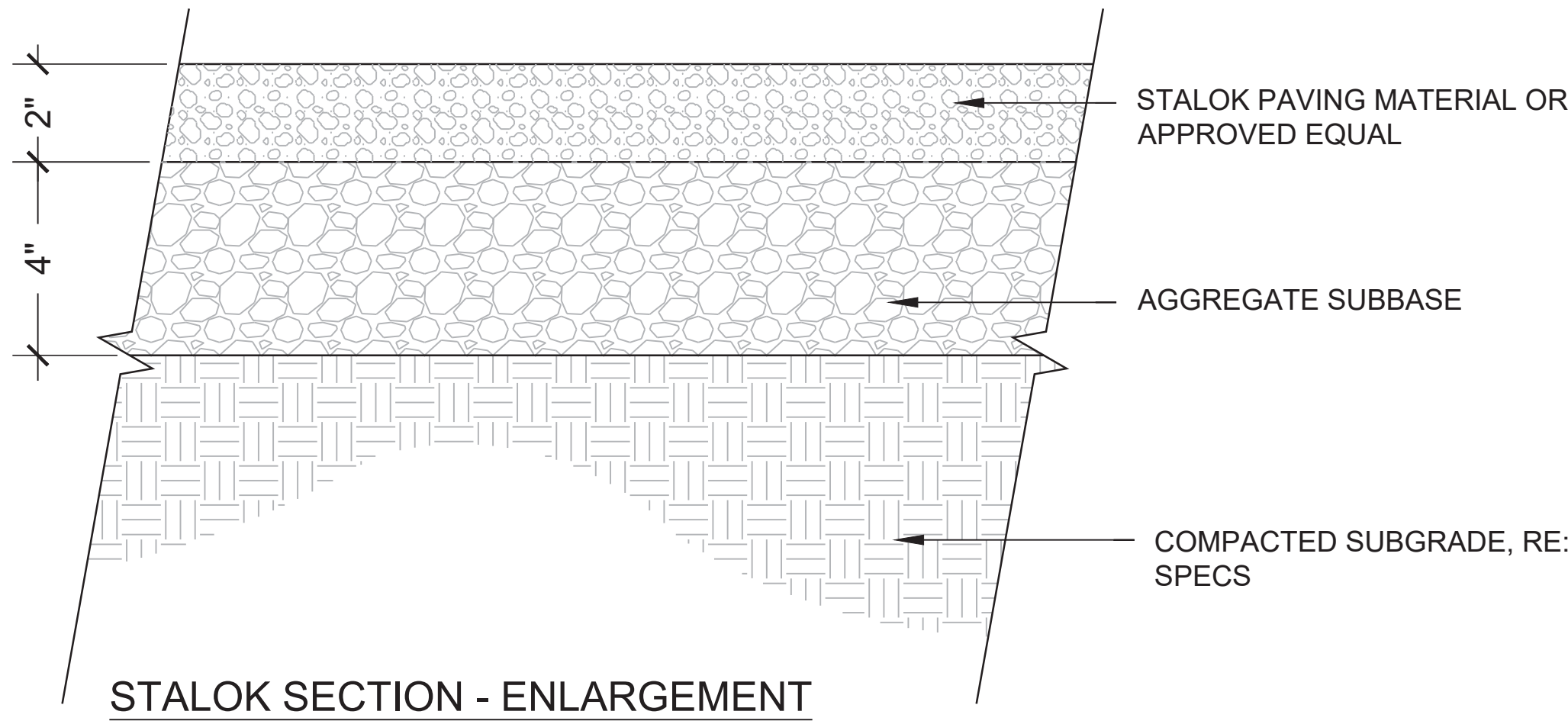
- NOTES:
- 1. FIELD VERIFY SPOT ELEVATIONS OF FOOTINGS PRIOR TO INSTALLATION.
 - 2. ADJ CONCRETE SHALL NOT BE HIGHER THAN COLUMN FOOTING.
 - 3. MIRACOTE MICROTOPPING SHALL BE LEVEL WITH ADJ CONCRETE OR SLOPE TO PROVIDE POSITIVE DRAINAGE AWAY FROM COLUMN.
 - 4. MIRACOTE MICROTOPPING TO BE APPLIED IN LOCATIONS WHERE COLUMN FOOTING IS EXPOSED.
 - 5. MIRACOTE MICROTOPPING COLOR TO MATCH ADJACENT CONCRETE. BROOM FINISH TO MATCH DIRECTION OF BROOM FINISH OF ADJACENT CONCRETE.
 - 6. FOOTING SURFACE SHOULD BE LEVEL AND SMOOTH PRIOR TO APPLICATION OF MIRACOTE. APPLY MORTAR TO SURFACE PRIOR TO APPLICATION OF MIRACOTE.
 - 7. PROVIDE POSITIVE DRAINAGE AWAY FROM COLUMN AND AWAY FROM FOUNDATION.



1 MIRACOTE MICROTOPPING
NTS



2 STA-LOK PAVING
NTS



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No.	Description	Date

Project No.	2017880
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SITE
DETAILS

L4.1

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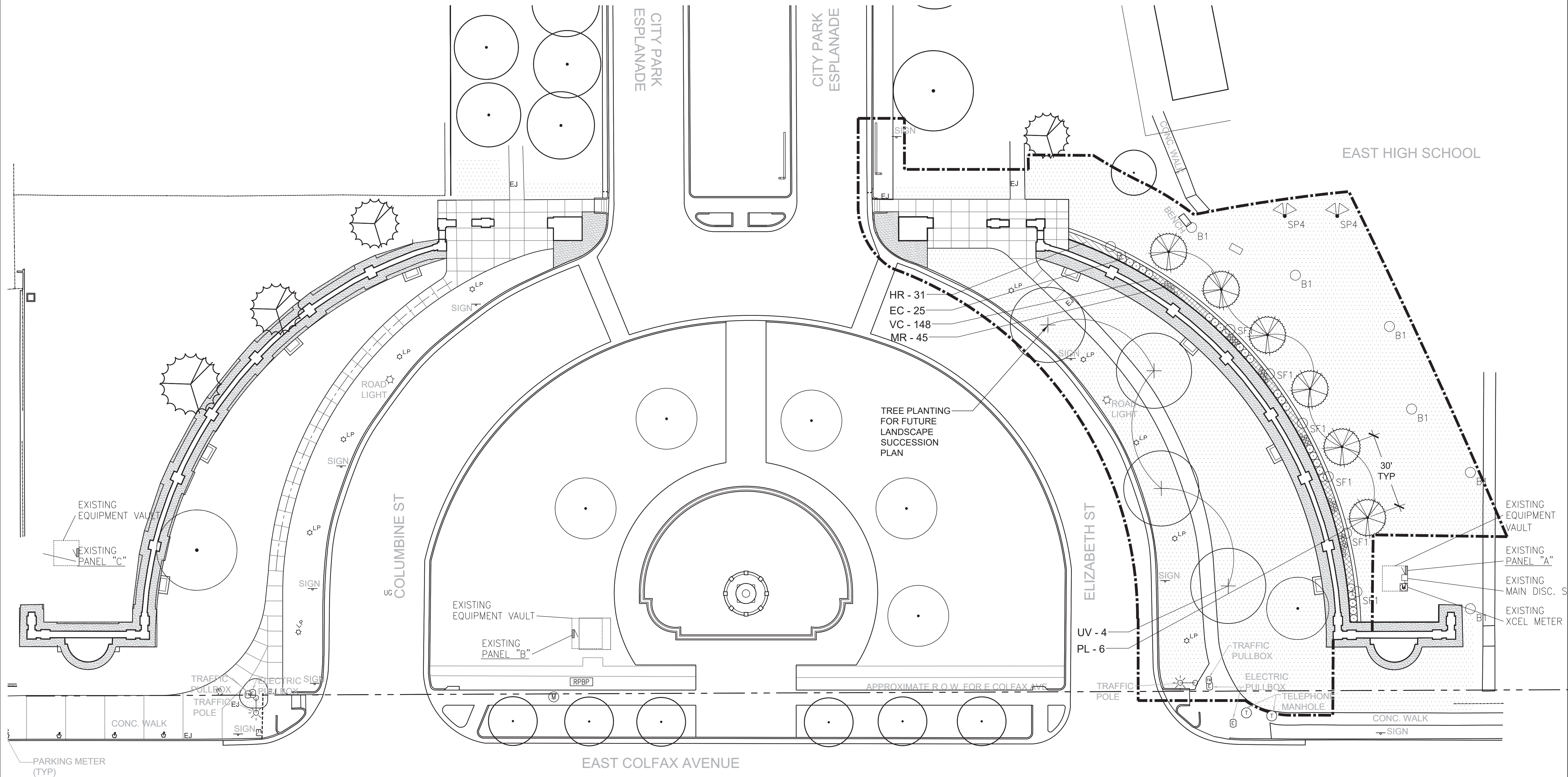
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PLANTING PLAN

L5.0



PHASE 3 LIMIT OF WORK

EXISTING TREE

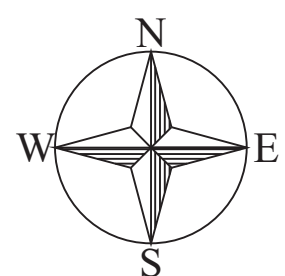
PROPOSED TREE

SOD

<u>DECIDUOUS TREES</u>	<u>QTY</u>	<u>BOTANICAL NAME / COMMON NAME</u>	<u>CONT</u>	<u>SIZE</u>
UV	4	Ulmus americana 'Valley Forge' / American Elm	n/a	4" Cal
<u>EVERGREEN TREES</u>	<u>QTY</u>	<u>BOTANICAL NAME / COMMON NAME</u>	<u>CONT</u>	<u>SIZE</u>
PL	6	Pinus leucodermis / Bosnian Pine	n/a	8' H
<u>SHRUBS</u>	<u>QTY</u>	<u>BOTANICAL NAME / COMMON NAME</u>	<u>CONT</u>	
EC	25	Euonymus fortunei 'Coloratus' / Coloratus Purple Wintercreeper	#5	
MR	45	Mahonia repens / Creeping Mahonia	#1	
<u>GROUND COVERS</u>	<u>QTY</u>	<u>BOTANICAL NAME / COMMON NAME</u>	<u>CONT</u>	<u>SPACING</u>
HR	31	Heuchera sanguinea 'Splendens' / Red Coral Bells	#1	18" o.c.
VC	148	Vinca minor 'Bowles' / Bowles' Common Periwinkle	#1	18" o.c.

Deciduous trees shall be balled and burlapped with full heads, straight trunks, and single leaders unless otherwise noted. All shade trees shall be 12'-14' high with 6'-8' spread and have their first branch 5'-7' above the top of the rootball.

1. ALL EXISTING GRASS STAND AREAS DISTURBED BY CONSTRUCTION OPERATIONS SHALL BE SOIL PREPARED AND SEEDED BY THE CONTRACTOR.
2. CONTRACTOR SHALL COORDINATE IRRIGATION AND PLANTING WORK SUCH THAT INSTALLED IRRIGATION EQUIPMENT SHALL NOT CAUSE ADJUSTMENT OF PLANTING LOCATIONS CONTRARY TO THE PLANS. IF IRRIGATION EQUIPMENT IS INSTALLED IN LOCATIONS OBSTRUCTING THE INTENDED LOCATIONS OF THE PLANTINGS, THE IRRIGATION EQUIPMENT SHALL BE RELOCATED.
3. ALL LANDSCAPING SHALL BE INSTALLED ACCORDING TO SOUND HORTICULTURAL PRACTICES IN A MANNER DESIGNED TO ENCOURAGE QUICK ESTABLISHMENT AND HEALTHY GROWTH.
4. ALL LANDSCAPE AREAS SHALL BE IRRIGATED WITH UNDERGROUND AUTOMATIC IRRIGATION SYSTEM.
5. CONTRACTOR SHALL FIELD VERIFY FINAL TREE LOCATIONS IN CONSULTATION WITH CITY AND LANDSCAPE ARCHITECT BASED UPON AS-BUILT DRAWINGS FOR UTILITIES. TREES TO BE LOCATED A MINIMUM OF 25' AWAY FROM WALLS.



A horizontal number line with tick marks at 0, 20, and 40. The region between 20 and 40 is shaded with vertical lines.

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[illegible]

PLANTING DETAILS

TREE PROTECTION ZONES
 THE TREE PROTECTION ZONE (TPZ) SHALL BE EQUAL TO EIGHTEEN INCHES (18") RADIALLY FROM THE TREE FOR EVERY ONE INCH OF TRUNK DIAMETER AT BREAST HEIGHT (DBH = 4.5" ABOVE SOIL LINE). THE CRITICAL ROOT ZONE (CRZ) SHALL BE EQUAL TO TWELVE INCHES (12") RADIALLY FROM THE TREE FOR EVERY ONE INCH OF TRUNK DIAMETER AT BREAST HEIGHT (DBH = 4.5" ABOVE SOIL LINE). THE STRUCTURAL ROOT ZONE (SRZ) SHALL BE EQUAL TO 0.9' (10.8") RADIALLY FROM THE TREE FOR EVERY ONE INCH OF TRUNK DIAMETER AT BREAST HEIGHT (DBH = 4.5" ABOVE SOIL LINE).

AREA 2
LOWER CANOPY PROTECTION CONTACT OFFICE OF THE CITY FORESTER IF POTENTIAL FOR DAMAGE EXISTS AND/OR IF PRUNING, INCLUDING BUT NOT LIMITED TO CLEARANCE FOR BUILDING(S) AND/OR CONSTRUCTION SCAFFOLDING, IS NEEDED.

SECTION

NOTES:

1. OFFICE OF THE CITY FORESTER TREE RETENTION AND PROTECTION SPECIFICATIONS SHALL BE FOLLOWED THROUGHOUT DURATION OF PROJECT.
2. DAMAGE TO PROTECTED TREES IS SUBJECT TO PENALTY PER CITY ORDINANCE.
3. TREE PROTECTION SHALL BE INSTALLED PRIOR TO COMMENCEMENT OF DEMOLITION/ CONSTRUCTION ACTIVITIES, APPROVED BY OFFICE OF THE CITY FORESTER STAFF, AND SHALL REMAIN IN PLACE UNTIL CERTIFICATE OF OCCUPANCY IS ISSUED BY THE CITY AND COUNTY OF DENVER.
4. ONCE APPROVED BY THE OFFICE OF THE CITY FORESTER, THE TREE PROTECTION ZONE SHALL NOT BE RESIZED, MODIFIED, REMOVED, OR ALTERED IN ANY MANNER WITHOUT PRIOR WRITTEN APPROVAL.
5. ENTRANCE/ACCESS TO THE TREE PROTECTION ZONE IS NOT PERMITTED WITHOUT PRIOR WRITTEN APPROVAL FROM THE OFFICE OF THE CITY FORESTER.
6. NO MATERIALS, DEBRIS, EQUIPMENT, OR SITE AMENITIES SHALL BE STORED WITHIN THE TREE PROTECTION ZONE WITHOUT PRIOR WRITTEN APPROVAL FROM THE OFFICE OF THE CITY FORESTER.
7. WHILE TREE PROTECTION FENCING IS IN PLACE, TREES SHALL BE DEEP-ROOT WATERED AT AN INTERVAL OF ONCE PER WEEK WHEN TEMPERATURES ARE AT OR ABOVE 50-DEGREES F. TREES SHALL BE WATERED AT A RATE OF 10 GALLONS PER INCH CALIPER.
8. MINIMUM TREE PROTECTION ZONE, AREA 1 FENCING SHALL BE "ORANGE PLASTIC SAFETY FENCING," MIN. 48" IN HEIGHT, TOP SECURED TO METAL T-POSTS WITH 12-GAUGE WIRE WOVEN THROUGH TOP FENCING FOR ENTIRE LENGTH.
 - HEAVY DUTY T-POSTS SHALL BE PLACED SO THAT WIRE AND FENCE ARE TAUT.
 - CHAIN LINK FENCING IS RECOMMENDED AND MAY BE REQUIRED BY THE OFFICE OF THE CITY FORESTER WHERE HEAVY CONSTRUCTION ACTIVITY IS ADJACENT TO EXISTING TREES.
 - "TREE PROTECTION ZONE" SIGNS SHALL REMAIN IN PLACE AS POSTED BY OFFICE OF THE CITY FORESTER AND SHALL BE MAINTAINED IN THE CONDITION IN WHICH THEY WERE INSTALLED.

The diagram illustrates the installation of a container stock into a landscape. The cross-section view on the left shows a container stock being placed into a hole. The hole is filled with backfill/soil conditioner, and a 6-inch saucer is placed around the plant. The container stock is placed on a compacted subgrade. The plan view on the right shows a grid of container stocks, with labels A, B, C, and D indicating different rows. A table on the right lists the plant sizes for each row.

PLANT
6"
8"
12"
18"
23"
30"
36"
48"
60"
72"

Labels in the diagram include:

- PRUNE ONLY DEAD OR DAMAGED BRANCHES
- PLANT ROOTBALL 2" ABOVE FINISH GRADE. REMOVE CONTAINER.
- 3" DEPTH MULCH AS SPECIFIED
- 6" SAUCER AROUND PLANT
- BACKFILL/SOIL CONDITIONER, RE: SPECS
- FOR ROOT BOUND CONTAINER STOCK, MAKE SHALLOW SCORES (1/4" TO 1/2") ALONG SIDES OF THE ROOTBALL
- COMPACTED SUBGRADE, RE: SPECS
- SHRUBS, GROUNDCOVERS OR VINES
- CURB, EDGE OF WALK OR WALL

Dimensions and labels include:

- 2x POT DIA.
- A, B, C, D (row labels)

DO NOT CUT SINGLE LEADER. PRUNE ONLY DAMAGED, DEAD WOOD, OR CO-DOMINANT LEADERS.

12" NYLON TREE STRAP WITH GROMMETS ON GUY WIRE. DO NOT TWIST STRAPS TO TIGHTEN AROUND TRUNK.

1/2" DIAMETER WHITE PVC PIPE SECTION ON ENTIRE LENGTH OF EACH WIRE.

14-GAUGE GALVANIZED WIRE, DOUBLE STRAND. LEAVE 1-2" SLACK IN WIRE TO ALLOW FOR TRUNK MOVEMENT.

IF NEEDED, 6' STEEL T-POST OR WOOD STAKE (4' EXPOSED, 2' IN UNDISTURBED SUBGRADE) WITH SAFETY CAPS, SET TO WINDWARD SIDE AND OTHER OPPOSITE; OR OTHER PRE-APPROVED STAKING METHOD.

DECIDUOUS TREE FALL PLANTING: WRAP TRUNK TO FIRST BRANCH WITH SPECIFIED TREE WRAP MATERIAL. SECURE AT TOP WITH MASKING TAPE. DO NOT WRAP ROUGH BARK, POPULUS, OR GLEDITSIA TREES. REMOVE IN SPRING AS SPECIFIED.

SET TOP OF ROOT FLARE 2" TO 3" HIGHER THAN FINISHED GRADE. REMOVE EXCESS SOIL FROM TOP OF ROOT BALL.

3" DEPTH MULCH AS SPECIFIED. 4-6" AWAY FROM TRUNK, TO OUTER EDGE OF PLANTING HOLE.

FORM 2" HIGH DIRT SAUCER AROUND PIT AT OUTSIDE OF TRANSITION ZONE.

FG

COMPLETELY REMOVE ALL TWINE AND WIRE BASKET. PULL BURLAP DOWN MINIMUM OF 2/3, CUT AND REMOVE FROM PIT.

SLOPE SIDES OF PLANTING PIT AS SHOWN, ROUGHEN SIDES PRIOR TO BACKFILL.

NATIVE SOIL OR APPROPRIATE PLANTING MEDIA

UNDISTURBED SUBGRADE

ANY BROKEN, CRUMBLING, OR OTHERWISE DAMAGED ROOTBALL SHOULD BE REJECTED. DO NOT DAMAGE DURING PLANTING.

GUYING PATTERN FOR DEC. TREE PLANTING

SECTION

- An approved planting permit from the Office of the City Forester (OCF), regardless of approved plans, is required prior to planting.
- Administrative citations up to \$999 shall be issued for trees planted without an OCF issued permit..
- Only tree species approved by or listed on the OCF's approved street tree list shall be planted in the PRW.
- For a list of prohibited or suspended PRW trees, contact the OCF website.
- If overhead utility wires exist in the PRW, only ornamental or trees maturing at 20 (twenty) feet maximum height shall be planted.
- Trees shall be centered in tree lawns and/or planting areas.
- Trees shall not be planted in tree lawns less than five feet wide unless authorized by the OCF.
- Where sidewalks are not present, trees shall be located as designated by Office of the City Forester.
- Planting in corner triangle formed by the first 30 (thirty) feet along the PRW line in each direction from the corner is not permitted.
- Planting within 10 (ten) feet of alleys, driveways, or fire hydrants is not permitted.
- Planting within 20 (twenty) feet of stop signs is not permitted.
- Planting within 25 (twenty-five) feet of street lights is not permitted.
- Planting within five feet of water meters or pits is not permitted.
- Large shade trees shall be spaced 35 (thirty-five) feet o.c. and ornamental trees 25 (twenty-five) feet o.c. or as designated by OCF.
- Trees shall be pruned to maintain a clearance of 13'-6" over streets and alleys and 6'-6" over remaining portions of PRW, including sidewalks.

3 TREE PLANTING

Irrigation Construction Notes

- DRAWINGS AND BASE INFORMATION** – ALL BASE AND PLANTING INFORMATION HAVE BEEN PROVIDED BY MUNDUS BISHOP DESIGN. THE CONTRACTOR IS RESPONSIBLE TO NOTIFY HYDROSYSTEMS*KDI OF ANY DISCREPANCIES BETWEEN THE UTILITY OR PLANTING PLANS AND THE IRRIGATION PLAN. IF CONTRACTOR FAILS TO NOTIFY HYDROSYSTEMS*KDI AND MAKES CHANGES TO THE IRRIGATION SYSTEM DESIGN, HE ASSUMES ALL COSTS AND LIABILITIES ASSOCIATED WITH THOSE FIELD CHANGES. REFER TO SPECIFICATIONS FOR ADDITIONAL PROJECT REQUIREMENTS.
- 2. SYSTEM PRESSURE** – HYDROSYSTEMS*KDI HAS CONTACTED DENVER PARKS AND RECREATION AND THEY HAVE BEEN TOLD THAT THE STATIC WATER PRESSURE FROM THE IRRIGATION PUMP SYSTEM SHOULD BE 50 PSI MIN. THE CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY PRESSURE PRIOR TO COMMENCING ANY CONSTRUCTION AND NOTIFY HYDROSYSTEMS*KDI OF ANY VARIANCE FROM THE STATED PRESSURE. IF CONTRACTOR FAILS TO FIELD VERIFY PRESSURE AND/OR NOTIFY HYDROSYSTEMS*KDI OR ANY VARIATIONS FROM THIS PRESSURE, THEN HE ASSUMES ALL CONSTRUCTION AND ENGINEERING COSTS ASSOCIATED WITH SYSTEM MODIFICATIONS REQUIRED TO ACCOMMODATE ACTUAL SITE PRESSURE. THIS SYSTEM HAS BEEN DESIGNED FOR A REQUIRED STATIC PRESSURE OF 50 PSI MINIMUM.
- 3. IRRIGATION SYSTEM OPERATION INTENT** – THIS IRRIGATION SYSTEM HAS BEEN DESIGNED TO IRRIGATE THE ESTABLISHED LANDSCAPE WITHIN A THREE (3) HOUR PER WEEK, SIX (6) HOUR PER NIGHT WATERING WINDOW. ESTABLISHMENT WATERING WILL REQUIRE UP TO TWICE AS MUCH IRRIGATION FOR A FOUR TO SIX WEEK PERIOD. THE DESIGN IS BASED ON THE FOLLOWING PROJECTED WEEKLY APPLICATION RATES AFTER ESTABLISHMENT. THESE FIGURES ARE BASED ON A 30-YEAR AVERAGE WEATHER DATA AND WILL NEED TO BE ADJUSTED DUE TO SEASONAL CHANGES AND WEATHER CONDITIONS ABOVE AND BELOW THE AVERAGE VALUES UTILIZED.
- | | |
|-------------------|--|
| TURF | 1.75" PER WEEK PEAK SEASON |
| NATIVE SEED MIXES | 0.77" PER WEEK PEAK SEASON (TWO SEASONS) |

NOTE: IT IS THE INTENT OF THIS DESIGN THAT NATIVE AREAS WOULD ONLY BE IRRIGATED FOR ESTABLISHMENT.

4. **EQUIPMENT INSTALLATION** – IT IS THE INTENT OF THIS DESIGN THAT ALL IRRIGATION EQUIPMENT BE INSTALLED WITHIN PROPERTY LIMITS AND WITHIN LANDSCAPED AREAS. ANY EQUIPMENT SHOWN OUTSIDE OF THESE LIMITS IS SHOWN IN THAT LOCATION FOR GRAPHICAL CLARITY ONLY. ALL VALVE BOXES SHALL BE INSTALLED A MINIMUM OF 6'-0" FROM EDGE OF ANY PAVED SURFACES. ALL VALVE BOXES SHALL BE PLACED A MINIMUM OF 3'-0" FROM THE CENTERLINE OF ANY DRAINAGE SWALE.
5. **SLEEVING** – ALL MAINLINE OR LATERAL LINES UNDER PAVED SURFACES SHALL BE SLEEVED. ALL SLEEVING UNDER PAVED SURFACES SHOWN ON PLANS IS BY CONTRACTOR UNLESS OTHERWISE NOTED. SLEEVING SHALL BE INSTALLED IN THE SIZES AND QUANTITIES SHOWN ON PLANS OR BASED ON THE SCHEDULE BELOW. WHERE SLEEVES ARE SHOWN, BUT NOT LABELED, FOLLOW THE SCHEDULE BELOW. ALL MAINLINE, CONTROL WIRES AND DRIP LINES UNDER PAVED SURFACES ARE TO BE INSTALLED IN SLEEVING.
- | <u>SLEEVED PIPE SIZE</u> | <u>WIRE QUANTITY</u> | <u>REQUIRED SLEEVE SIZE & (QUANTITY)</u> |
|--------------------------|----------------------|--|
| 1" – 1½" PIPING | | 2" PVC (1) |
| 1½" – 2" PIPING | | 4" PVC (1) |
| 2½" – 3" PIPING | | 6" PVC (1) |
| DECODER CABLE | | 2" PVC (1) |











NOTE: EACH LENGTH OF SLEEVED PIPE SHOWN SHALL BE ROUTED THROUGH SEPARATE SLEEVE.

6. **POP-UP SPRAY NOZZLES** – CONTRACTOR TO INSTALL PLASTIC NOZZLES ON ALL POP-UP SPRAY HEADS. INSTALL 15 SERIES NOZZLES ON ALL HEADS SPACED AT 13' TO 15'. INSTALL 12 SERIES NOZZLES ON ALL HEADS SPACED 11' TO 12'. INSTALL 10 SERIES NOZZLES ON ALL HEADS SPACED AT 9' TO 10'. INSTALL 8 SERIES NOZZLES ON ALL HEADS SPACED LESS THAN 8'. INSTALL SIDE STRIP NOZZLES ON ALL HEADS WITH AN "S" DESIGNATION AND RIGHT AND LEFT CORNER STRIP NOZZLES ON ALL HEADS WITH AN "L" OR "R" DESIGNATION. VARIABLE ARC NOZZLES SHOULD BE UTILIZED ADJACENT TO CURVILINEAR SHRUB BEDS OR FOR ANY ANGLES THAT ARE NOT A STANDARD NOZZLE ANGLE (MAY REQUIRE APPROVAL BY PROJECT MANAGER SPECIFIC TO SITUATION).
7. **TREES SHOWN ON IRRIGATION PLANS ARE APPROXIMATE.**
8. **ALL IRRIGATION HEAD LOCATIONS SHALL BE STAKED, FLAGGED AND/OR OTHERWISE CLEARLY MARKED ON THE GROUND PRIOR TO INSTALLATION. SPRINKLER HEAD STAKING SHALL BE INSPECTED AND APPROVED BY THE LANDSCAPE PARK SUPERVISOR PRIOR TO INSTALLATION. STAKED LOCATIONS SHALL BE SPACED TO PROVIDE HEAD-TO-HEAD COVERAGE. CONTRACTOR IS RESPONSIBLE FOR HEAD-TO-HEAD COVERAGE IN IRRIGATION SYSTEM. CONTRACTOR SHALL FIELD-STAKE PROPOSED AND EXISTING ROTOR LOCATIONS WITH FLAGS OF DIFFERENT COLORS FOR REVIEW/ADJUSTMENT AND APPROVAL PRIOR TO INSTALLATION.**
9. **CHALK PROPOSED LATERAL PIPE ROUTING WITHIN DESIGNATED TREE MASSES AND OBTAIN APPROVAL FROM DENVER DEPARTMENT OF FORESTRY AND DISTRICT REPRESENTATIVE PRIOR TO TRENCHING AND/OR PLOWING OF PIPING AND/OR EXCAVATING FOR HEAD INSTALLATION.**

--FOR CONSTRUCTION--
100% CONSTRUCTION DOCUMENTS
SET

10. **CONTRACTOR** SHALL BE RESPONSIBLE FOR MAINTAINING EXISTING PLANT MATERIAL LOCATED INSIDE AND OUTSIDE WORK LIMITS IN A VIBLUE, GREEN, HEALTHY CONDITION UNTIL FINAL ACCEPTANCE OF PROJECT. THIS SHALL INCLUDE PROVIDING TEMPORARY WATERING OF PLANT MATERIAL AS CONDITIONS REQUIRE. DEAD PLANT MATERIAL DETERMINED BY OWNER'S REPRESENTATIVE AS HAVING DIED DUE TO LACK OF INTERIM MAINTENANCE BY CONTRACTOR SHALL BE REPLACED BY CONTRACTOR AT NO ADDITIONAL COST TO OWNER.
11. **EXCESS** DIRT GENERATED BY TRENCHING OPERATIONS SHALL BE DISPOSED OF BY CONTRACTOR AT OFF-SITE LOCATION AT NO ADDITIONAL COST TO OWNER.
12. **ADJUSTMENT** – CONTRACTOR SHALL FINE TUNE/ADJUST THE IRRIGATION SYSTEM TO REDUCE/AVOID OVERSPRAY ONTO HARD SURFACES, INCLUDING THE TERRA COTTA HOLLAND BENCHES BY ADJUSTING NOZZLE DIRECTION AND NOZZLE RADIUS.
13. **CONTRACTOR** SHALL PREVENT SEDIMENT, DEBRIS AND ALL OTHER POLLUTANTS FROM ENTERING THE STORM SEWER SYSTEM DURING ALL DEMOLITION OR CONSTRUCTION OPERATIONS THAT ARE PART OF THIS PROJECT. THE CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL REMOVE ALL SEDIMENT, MUD, AND CONSTRUCTION DEBRIS THAT MAY ACCUMULATE IN THE FLOWLINES AND PUBLIC RIGHTS OF WAYS OF THE CITY AND COUNTY OF DENVER AS A RESULT OF THIS CONSTRUCTION PROJECT. SEDIMENT REMOVAL SHALL BE CONDUCTED IN A TIMELY MANNER.
14. **CONTRACTOR** SHALL PREPARE AND SUBMIT A PLAN FOR STAGING. IT IS REQUIRED THAT ONE AREA IS COMPLETED BEFORE ANOTHER AREA IS BEGUN. STAGING EQUIPMENT IN AREAS NOT OWNED BY DENVER PARKS SHALL REQUIRE WRITTEN PERMISSION OF THE LANDOWNER AND MUST BE APPROVED BY DENVER PARKS OR ITS REPRESENTATIVE.
15. **ALL** PIPING WITHIN THE DRIPLINE OF EXISTING TREES SHALL BE HAND DUG. ROOTS OVER 2" IN DIAMETER SHALL NOT BE CUT. PIPING SHALL BE TUNNELED UNDER THESE ROOTS. WHEN IN DOUBT, CONTACT DENVER PARKS FORESTRY DIVISION AND DISTRICT SUPERINTENDENT AND PROJECT MANAGER FOR DECISIONS.
16. **UNLABELED PIPING** – ALL UNLABELED LATERAL PIPING SHALL BE 1" MINIMUM UNLESS OTHERWISE NOTED.
17. **EXISTING IRRIGATION DAMAGE** – CONTRACTOR SHALL REPAIR OR REPLACE ANY EXISTING IRRIGATION SYSTEMS DAMAGED DURING NEW INSTALLATION. REPAIR OR REPLACEMENT SHALL BE DETERMINED BY OWNER OR OWNER'S REPRESENTATIVE AND PAID FOR BY THE LANDSCAPE CONTRACTOR.
18. **EXISTING IRRIGATION COORDINATION** – EXISTING IRRIGATION SYSTEM SHALL NOT BE TURNED OFF FOR MORE THAN 24 HOURS MAXIMUM. CONTRACTOR SHALL COORDINATE TURN OFF OF SYSTEM WITH OWNER OR MAINTENANCE STAFF 72 HOURS PRIOR TO ANY NEW CONSTRUCTION.
19. **EXISTING CONDITIONS** – LIMITED IRRIGATION AS-BUILT AND SURVEY INFORMATION WAS AVAILABLE OR PROVIDED AT THE TIME OF THIS DESIGN. LOCATION OF ALL EXISTING IRRIGATION COMPONENTS, PLANTING BEDS AND HARDSCAPES ARE APPROXIMATE AND SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
20. **EXISTING TREES** – ALL TRENCHING WITHIN THE CANOPY OF EXISTING SHADE TREES SHALL BE DONE BY HAND OR USE OF AIR SPADE, CONTRACTOR TO NOTIFY PROJECT MANAGER 72 HOURS PRIOR TO ANY DIGGING WITHIN TREE TRIP LINES. MARK OUT PROPOSED PIPING ROUTING AND COORDINATE WITH PM AND FORESTRY FOR APPROVAL OF PIPE ROUTING, PRIOR TO ANY INSTALLATION. SEE SPECIFICATIONS FOR EXISTING TREE PROTECTION PROCEDURES.

Irrigation Schedule

SYMBOL	MANUFACTURER	MODEL NO.	DESCRIPTION	DETAIL NO.
	RAIN BIRD	1806-SAM-PRS W/ MPR SERIES NOZZLE	POPOP SPRAY HEAD	2
	RAIN BIRD	5006-SAM-SS W/ #NOZ	GEAR DRIVEN ROTOR	3
		100 PSI-NSF	POLY LATERAL -1" MIN.	1
		EXISTING -2"	ELECTRIC CONTROL VALVE	N/S
			EXISTING CONTROL ZONE INDICATOR	N/S
			EXISTING PVC MAINLINE	N/S
			EXISTING POLY LATERAL LINE	N/S
			EXISTING PVC SLEEVE	N/S
		TO BE RELOCATED AND ADJUSTED	EXISTING POP-UP HEAD	2
		TO BE RELOCATED AND ADJUSTED	EXISTING ROTOR	3



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Architects, PC

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SULLIVAN GATEWAY

Gateway Rehabilitation

Colfax Ave & Elizabeth St.

[illegible]


Project No.	2017880
Issue	PHASE 3 100% CD's
Date	03/08/2018
Drawn by	HO
Checked by	KD
Scale	AS SHOWN

Cover Sheet
IRRIGATION NOTES
& SCHEDULE

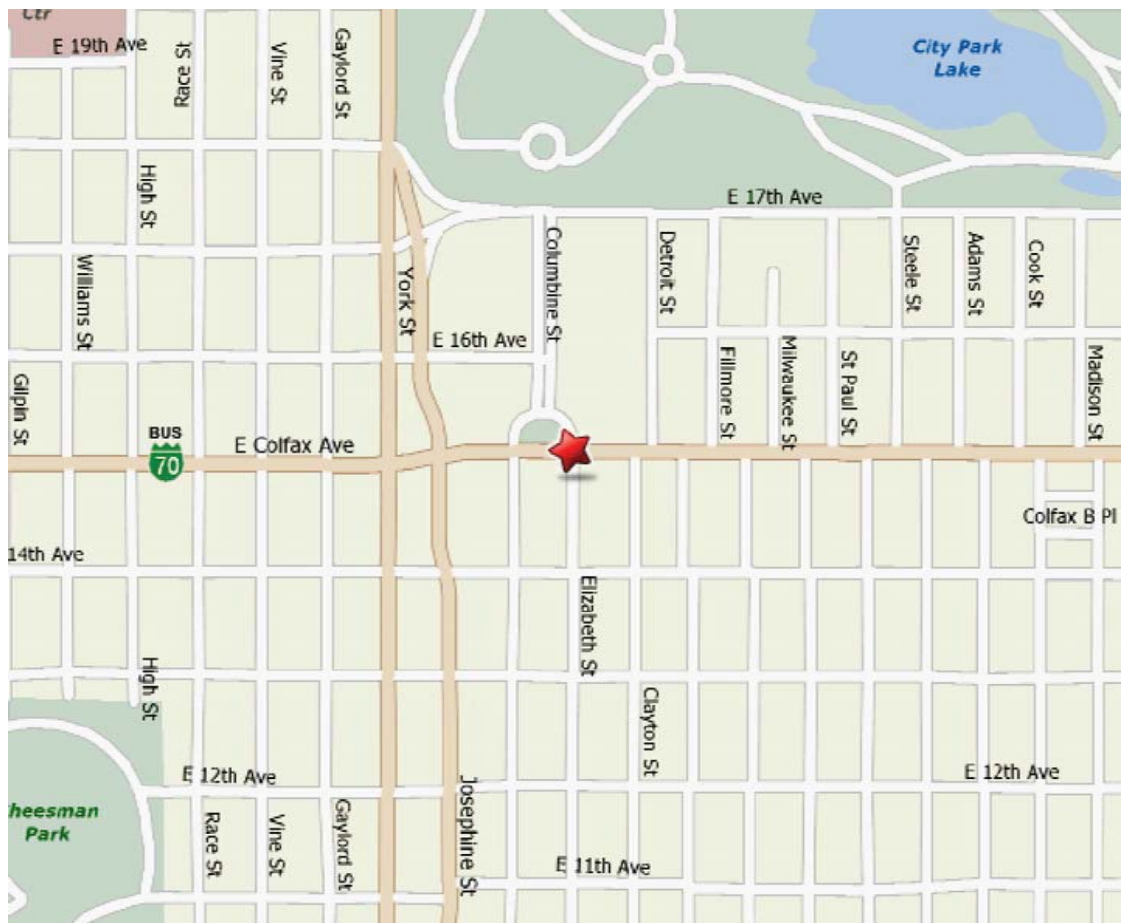
11.0



Know what's below.
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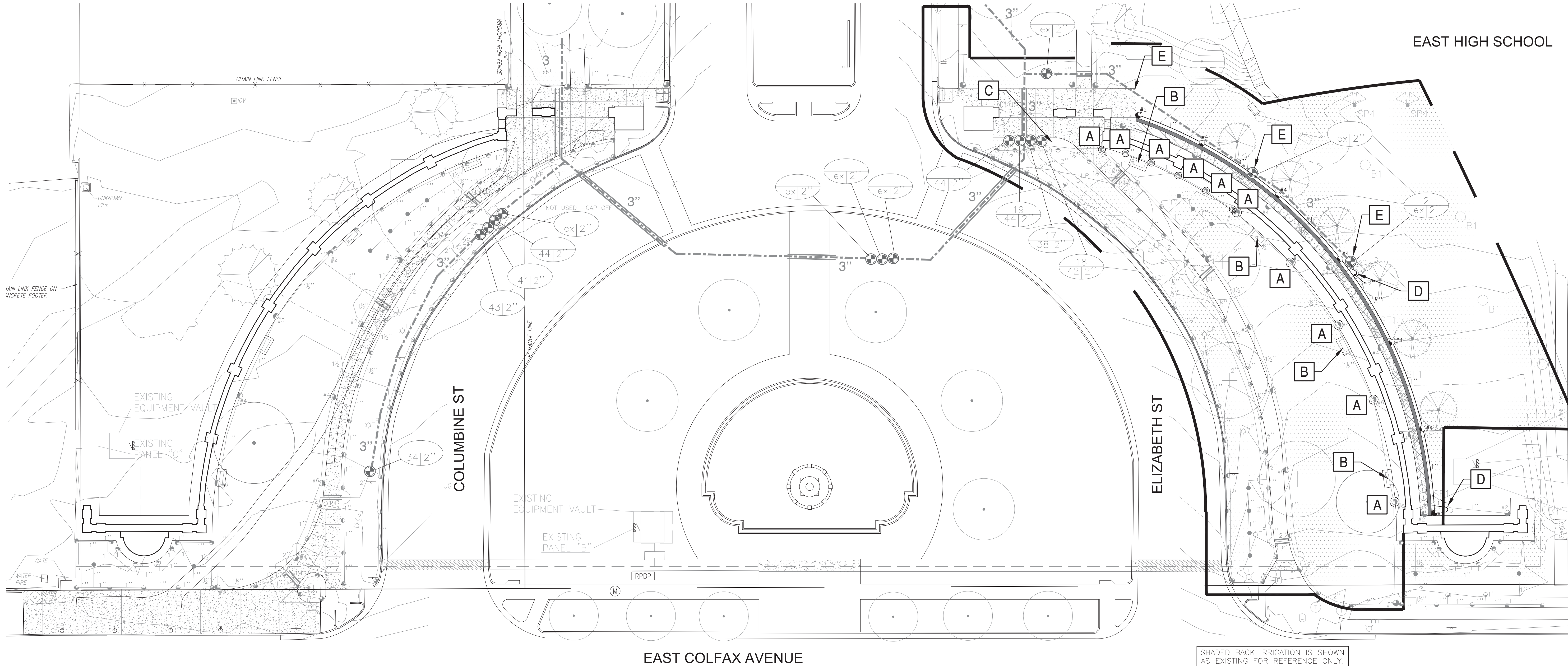
860 Tabor Street, Suite 200
Lakewood, Colorado 80401
303-980-5327
303-980-5384 (fax)



1 VICINITY MAP
N.T.S.



- | | |
|----------|--|
| A | CONTRACTOR SHALL RE-LOCATE THE EXISTING SPRAY HEAD AT THIS APPROXIMATE LOCATION INTO THE TURF AREA AS NEEDED, THEN ADJUST TO AVOID OVER SPRAY INTO THE HARDSCAPE AREAS TERRA COTTA |
| B | CONTRACTOR SHALL ADJUST THE EXISTING IRRIGATION EQUIPMENT (LATERAL LINES & SPRAY HEADS) AROUND THE NEW BENCH CONCRETE PADS. |
| C | CONTRACTOR SHALL ADJUST THE EXISTING IRRIGATION EQUIPMENT (LATERAL LINES & SPRAY HEADS) AROUND THE NEW TURF AND HARDSCAPE AREAS, THEN ADJUST TO AVOID OVER SPRAY. |
| D | CONTRACTOR SHALL LOCATE THE EXISTING LATERAL LINE AT THIS APPROXIMATE LOCATION, CUT, TIE-ON AND EXTEND THE NEW LATERAL LINE AS SHOWN. |
| E | CONTRACTOR SHALL LOCATE THE EXISTING IRRIGATION EQUIPMENT (PVC MAINLINE, CONTROL WIRES, LATERAL LINE AND ELECTRIC CONTROL VALVES) AND PROTECT AS NEEDED. REPAIR OR REPLACEMENT OF ANY DAMAGE TO THE EXISTING IRRIGATION EQUIPMENT IS BY CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER. |



1 IRRIGATION PLAN

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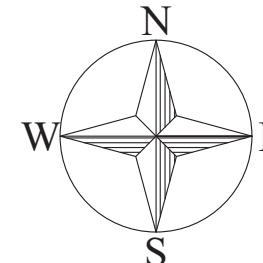
REFER TO SHEET	
I1.0	IRRIG. SCHEDULE AND NOTES
I1.1	IRRIGATION PLAN
I1.2	IRRIGATION DETAILS



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Project No.	2017880
Issue	PHASE 3 100% CD's
Date	03/08/2018
Drawn by	HO
Checked by	KD
Scale	AS SHOWN

Cover Sheet IRRIGATION PLANS

11.1



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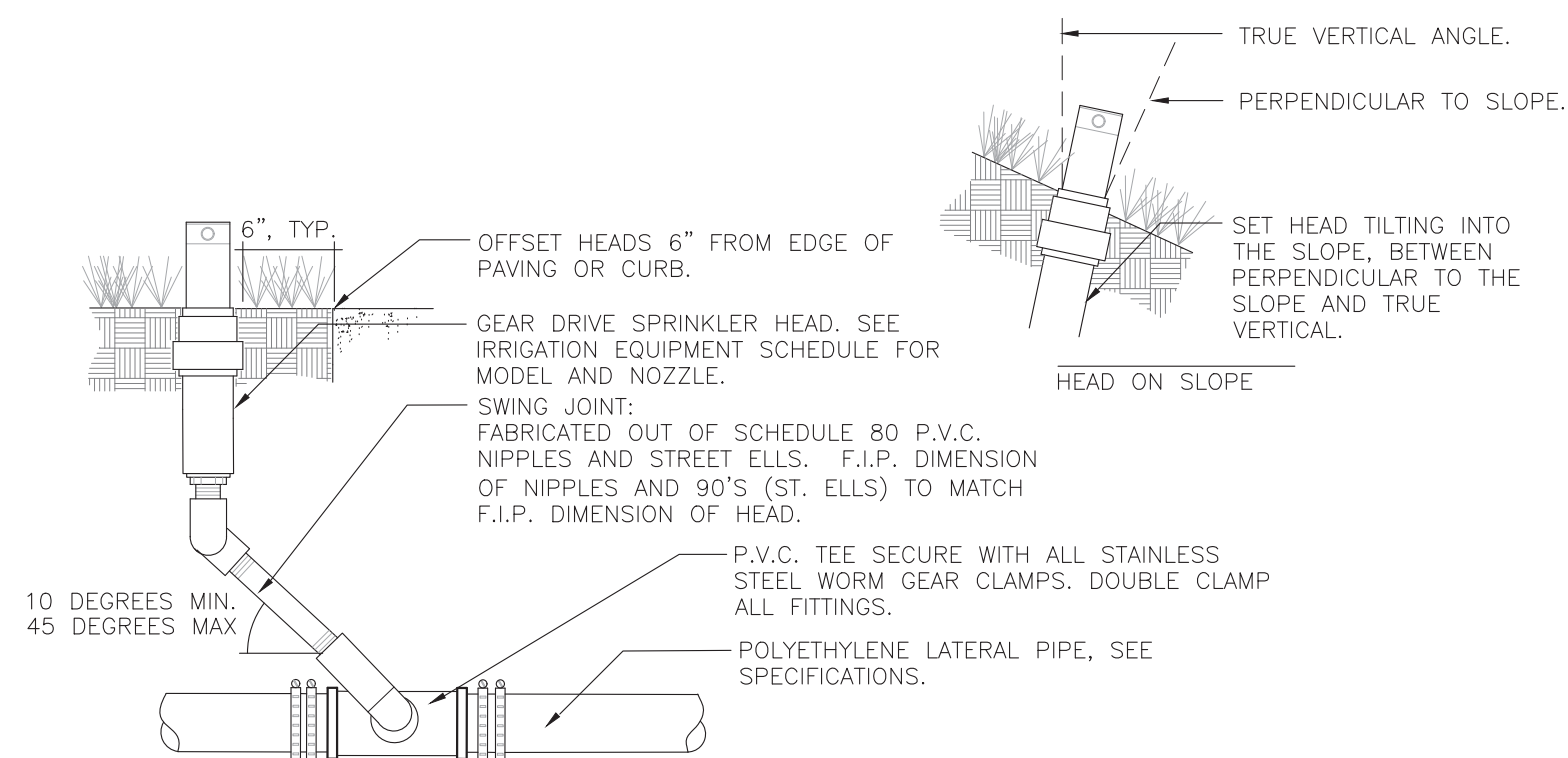
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






- NOTE:
1. PLUMB HEAD PERPENDICULAR TO FINISHED GRADE OR AS SPECIFIED FOR HEADS ON SLOPE.
 2. SET CAP OF HEAD LEVEL WITH FINISHED GRADE TURFGRASS AREAS. SET TOP OF HEAD 1/2" ABOVE FINISHED GRADE IN SEEDD AREAS.

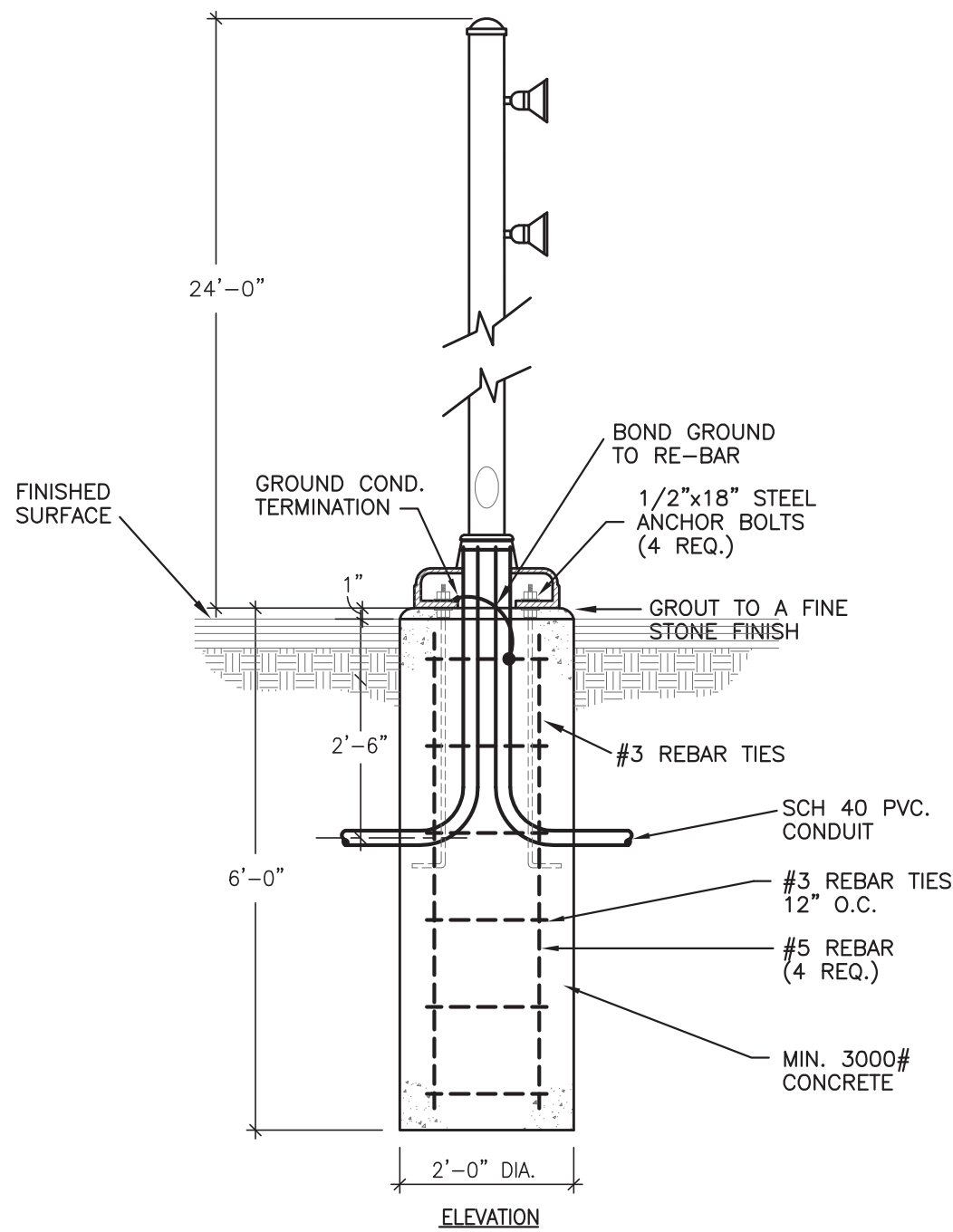
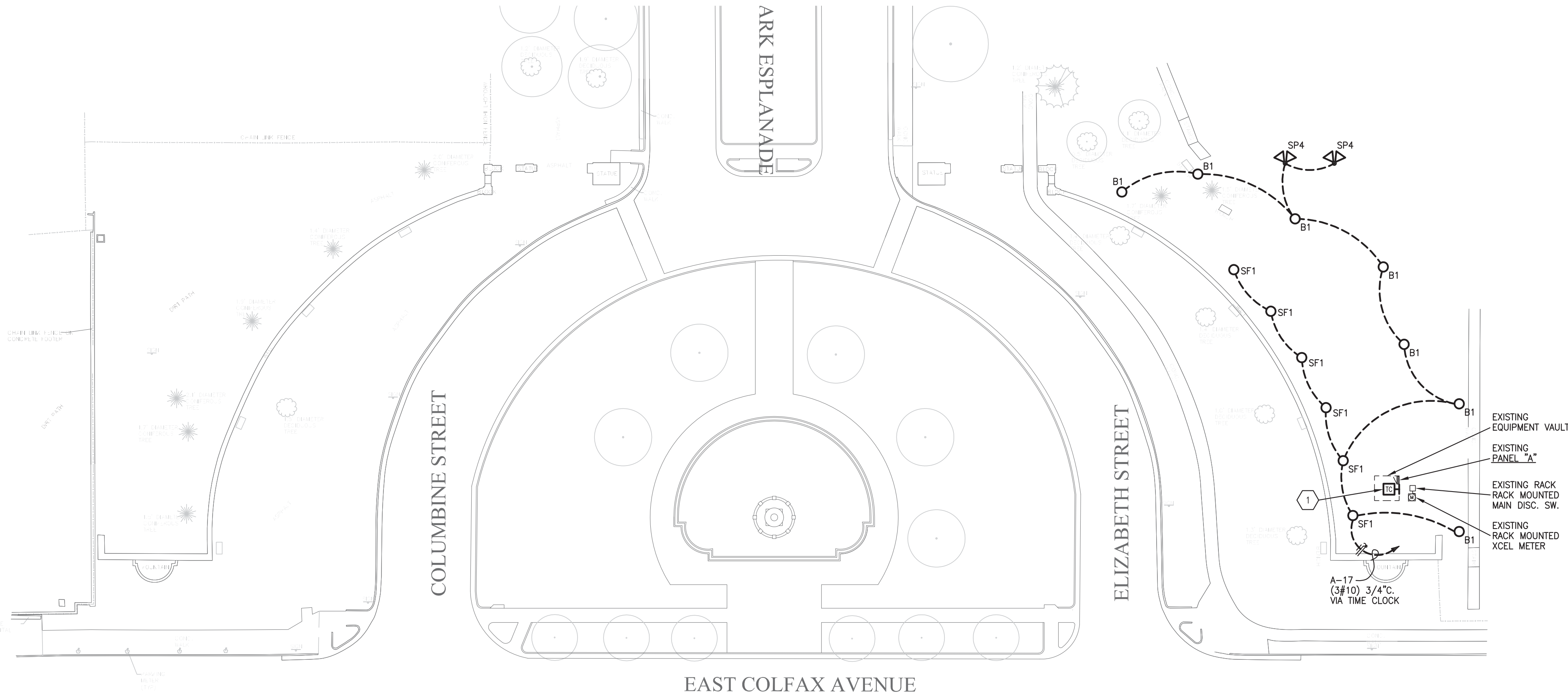
GEAR DRIVE ROTOR

REFER TO SHEET	
I1.0	IRRIG. SCHEDULE AND NOTES
I1.1	IRRIGATION PLAN
I1.2	IRRIGATION DETAILS

Gateway Rehabilitation
Colfax Ave & Elizabeth St.

11.2

ELECTRICAL LEGEND	
SYMBOL	DESCRIPTION
LIGHTING	
	SPST WALL SWITCH, +48" UNLESS NOTED OTHERWISE, LETTER DENOTES SWITCHLEG.
	3-WAY WALL SWITCH, +48" ABOVE FLOOR UNLESS NOTED OTHERWISE.
	TIME-CLOCK CONTROLS.
	SURFACE OR PENDANT MOUNTED FIXTURE, TYPE AND SIZE PER FIXTURE SCHEDULE.
	WALL MOUNTED FIXTURE, TYPE AND MOUNTING PER FIXTURE SCHEDULE.
	POLE MOUNTED LANDSCAPE FLOOD LIGHT
	GRADE MOUNTED BOLLARD FIXTURE, TYPE AND MOUNTING PER FIXTURE SCHEDULE.
POWER / TELECOMM.	
	DUPLEX RECEPTACLE, +15" UNLESS NOTED OTHERWISE.
	DOUBLE-DUPLEX RECEPTACLE, +15" UNLESS NOTED OTHERWISE.
	JUNCTION BOX, WALL MOUNTED AT +15" UNLESS NOTED OTHERWISE.
	JUNCTION BOX ABOVE CEILING.
	BRANCH CIRCUIT PANELBOARD, +66" TO TOP OF PANEL.
	UTILITY METER.
CIRCUITING / TAGS	
	FLEX CONDUIT CONNECTION.
	CONDUIT, CONCEALED IN WALLS OR CEILING.
	CONDUIT, UNDERGROUND BURIED.
	BRANCH CIRCUIT HOMERUN TO PANELBOARD, ARROWS INDICATES NUMBER OF CIRCUITS.
	NEUTRAL, HOT, SWITCH LEG & GROUND CONDUCTORS AND CONTROL PAIR, RESPECTIVELY
	ELECTRICAL DETAIL NOTE REFERENCE.
	STUB-DOWN
	EXISTING TO REMAIN
	GROUND FAULT INTERRUPTER
	ISOLATED GROUND
	NON-FUSED
	SURFACE MOUNTED
	WEATHER-PROOF
NOTE: -WIRE DEVICES AND BOXES SHALL BE FLUSH MOUNTED UNLESS NOTED OTHERWISE. -HEAVY LINE WEIGHT INDICATES NEW WORK. -LIGHT LINE WEIGHT INDICATES EXISTING TO REMAIN. -LIGHT DASHED LINE WEIGHT INDICATES EXISTING TO BE REMOVED. ALL EXISTING DEVICES TO REMAIN SHALL BE RECONNECTED AS REQUIRED AFTER DEMOLITION IS COMPLETE. PROVIDE NEW CONDUIT AND WIRE AS REQUIRED.	



FIXTURE TYPE "SP4" POLE DETAIL

SCALE: NONE

(EXISTING)										PANEL "A"										VOLTAGE: 120/208V-3PH-4W									
MOUNTING: <input type="checkbox"/> FLUSH <input checked="" type="checkbox"/> SURFACE										NEMA RATING: <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 3R										A.I.C. RATING: 10,000									
SERVICE ENTRANCE RATED: <input checked="" type="checkbox"/>										ISOLATED GROUND BUS: <input type="checkbox"/>										MAIN C.B.: 200 AMP									
										LOCATION: VAULT A										BUS SIZE: 225 AMP									
BRANCH BREAKERS																													
CD	DESCRIPTION	SIZE	P	CIR	LEFT PHASE LOAD			RIGHT PHASE LOAD			CIR	SIZE	P	DESCRIPTION	CD														
					A	B	C	A	B	C																			
M	SUMP PUMP SP-1	20	1	1	1176			3700			2	60		PANEL "B" CENTER VAULT	M														
MR	CIRC PUMP FP-1	20	1	3		1176		3700			4	2	-----		M														
MR	CIRC PUMP CP-1	20	1	5			1176			3750	6	60		PANEL "C" WEST VAULT	M														
H	EUH-1	20	2	7	1000			3750			8	2	-----		M														
H	-----	20	2	9		1000					10	20	1	SPARE	M														
MR	VAULT FAN VF-1	20	1	11			100				12	20	1	SPARE	M														
MA	CONTROLS	20	1	13	1000						14	20	1	SPARE	M														
	SPARE	20	1	15							16	20	1	SPARE	M														
1 L	LANDSCAPE LIGHTS-EAST	20	1	17			525				18	20	1	SPARE	M														
	SPARE	20	1	19				-----			20	30			M														
	SPARE	20	1	21					-----		22	20		TVSS	M														
L	TEMP LIGHTS	20	1	23			75			-----	24	3	-----		M														
					3176	2176	1876	7450	3700	3750																			
					10626	5876	5826	Total Connected V.A.																					
					22128 Total Connected VA all Phases																								
CD	LOAD	CONNECTED	D.F.	KVA	AMPS																								
L	LIGHTING	600 VA	1.25	0.8																									
R	RECEPTACLES (1ST 10000)	0 VA	1.00	0.0																									
R	RECEPTACLES (REMAINING)	0 VA	0.50	0.0																									
M	MOTOR (LARGEST)	1176 VA	1.25	1.5																									
MR	MOTORS (REMAINING)	2452 VA	1.00	2.5																									
H	ELECTRIC HEAT	2000 VA	1.25	2.5																									
MA	ELECTRICAL MISC.	15900 VA	1.00	15.9																									
TOTAL ESTIMATED LOAD					22128 VA	23.1	64.1																						
1. NEW LOAD ON EXISTING SPARE BREAKER.																													
ALL SINGLE PHASE SHARED NEUTRAL CIRCUITS SHALL BE SUPPLIED WITH BREAKER HANDLE TIES PER NEC 210.4																													
PROVIDE ARC-FLASH LABELING AS REQUIRED BY 2017 NEC 110.16																													

FIXTURE SCHEDULE						
KEY	LAMP(S)	DESCRIPTION	FINISH	VOLT	MOUNTING	MFR
B1	24W/1005lm LED 4000K	DOMED CAP LED BOLLARD WITH WET LOCATION LABEL	DARK BRONZE	UNV	GRADE	KIM
SF1	25W/511lm LED 4200K	DIE CAST GROUND MOUNTED LED FIXTURE WITH 360 DEGREE OUTPUT AND WET LOCATION LABEL	BRONZE	UNV	GRADE	BEGA
SP4	50W/4200lm LED 4000K	POLE MOUNTED DOUBLE HEAD LED WITH TYPE II DISTRIBUTION AND CLEAR TEMPERED GLASS LENS. 24\"/>	DARK GREY	UNV	7\"/>	LANDSCAPE FORMS
		(HEAD) ARNE-018L2-05C-40K-UV1-CL (POLE #) AY60999-01				

DETAIL NOTES

- PROVIDE TORK #7120Z 24HR ASTRONOMIC TIME CLOCK. MOUNT INSIDE VAULT NEXT TO PANEL.
- LIGHT FIXTURES AND POLES SHALL MATCH EXISTING LIGHT FIXTURES AND POLES ALREADY INSTALLED ON THE WEST SIDE OF THE FOUNTAIN.



Anderson Hallas
Architects, PC

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SULLIVAN GATEWAY

Gateway Rehabilitation
Colfax Ave & Elizabeth St.

No.	Description	Date

Project number	1804
Issue	PHASE 3 100% CD's
Date	03/08/2018
Drawn by	DK
Checked by	JCN
Scale	As Noted

ELECTRICAL
SITE PLAN,
LEGEND & SCHED.

PROJECT INFORMATION					
PROJECT: Sullivan Gate PH. 3 Rehabilitaion			DRAWING REF: 3/8/2018 with ADD #1 updates		
Spectrum Accounting Ref: S- STANLEYG					
TYPE/ DESCRIPTION:			DATA:	Existing Square Footage:	NA
ADDRESS: Colfax Ave and Elizabeth St.				Added Square Footage:	NA
				Total SF ("SFTotal"):	0
BUDGET TITLE: Phase 3 Restoration				Months Duration ("MO"):	9
OWNER: City and County of Denver			DATES:	ESTIMATED -	November 5, 2018
ARCHITECT: Anderson Hallas				REVISED -	11.28.2018
ESTIMATOR: Graham Johnson				PRINTED -	29-Nov-18 2:34 PM
NOTES: Estimate with hard subcontractor bids for GMP evaluation, owner's contingency separated.					

DIV. #	DESCRIPTION	CURRENT (Revised) ESTIMATE			PRIOR (Original) EST.	
		\$ per SQ FT	TOTAL Estimate:	% of Total:	Revision Variance:	Original Estimate:
Div 1.1 General Conditions / Job Services		#DIV/0!	\$97,713.75	5.1%	0.0%	\$97,713.75
Div 1.9 Bldng. Permit / Fees / Insurance / Taxes		#DIV/0!	\$12,500.00	0.7%	0.0%	\$12,500.00
TOTAL: Construction Management		#DIV/0!	\$110,213.75	5.8%	0.0%	\$110,213.75
Div 2.0 Sitework / Utility Install		#DIV/0!	\$94,975.95	5.0%	0.0%	\$94,975.95
Div 2.1 Demolition		#DIV/0!	\$6,062.75	0.3%	0.0%	\$6,062.75
Div 2.2 Asbestos / Hazardous Material Abatement		#DIV/0!	\$0.00	0.0%	0.0%	\$0.00
Div 2.3 Site Structure / Parking Structure		#DIV/0!	\$0.00	0.0%	0.0%	\$0.00
Div 3.0 Concrete		#DIV/0!	\$29,043.00	1.5%	0.0%	\$29,043.00
Div 4.0 Masonry		#DIV/0!	\$1,368,802.84	71.8%	0.0%	\$1,368,802.84
Div 5.0 Steel / Metals		#DIV/0!	\$15,815.00	0.8%	0.0%	\$15,815.00
Div 6.0 Rough Carpentry		#DIV/0!	\$0.00	0.0%	0.0%	\$0.00
Div 6.2 Finish Carpentry / Millwork		#DIV/0!	\$0.00	0.0%	0.0%	\$0.00
Div 7.0 Roof / Thermal Systems		#DIV/0!	\$0.00	0.0%	0.0%	\$0.00
Div 8.0 Doors / Windows		#DIV/0!	\$0.00	0.0%	0.0%	\$0.00
Div 9.0 Finishes		#DIV/0!	\$0.00	0.0%	0.0%	\$0.00
Div 10.0 Specialties		#DIV/0!	\$0.00	0.0%	0.0%	\$0.00
DIV 11.0 Appliances		#DIV/0!	\$0.00	0.0%	0.0%	\$0.00
DIV 12.0 Furnishings		#DIV/0!	\$0.00	0.0%	0.0%	\$0.00
Div 14.0 Elevator		#DIV/0!	\$0.00	0.0%	0.0%	\$0.00
Div 15.1 Plumbing		#DIV/0!	\$0.00	0.0%	0.0%	\$0.00
Div 15.3 Heat / Vent / Cool		#DIV/0!	\$0.00	0.0%	0.0%	\$0.00
Div 15.4 Fire Sprinkler		#DIV/0!	\$0.00	0.0%	0.0%	\$0.00
Div 16.0 Electrical		#DIV/0!	\$63,109.00	3.3%	0.0%	\$63,109.00
TOTAL: Divisions 2-16		#DIV/0!	\$1,577,808.54	82.7%	0.0%	\$1,577,808.54
COMBINED TOTAL: Divisions 1-16		#DIV/0!	\$1,688,022.29	88.5%	0.0%	\$1,688,022.29
Div 70.0 Construction Contingency		#DIV/0!	\$52,852.22	2.8%	0.0%	\$52,852.22
Div 70.0 Owner's Contingency		#DIV/0!	\$47,979.12	2.5%	0.0%	\$47,979.12
Div 80.0 Contractor's Fee		#DIV/0!	\$71,554.15	3.8%	0.0%	\$71,554.15
Div 90.0 General Liability Insurance		#DIV/0!	\$12,967.04	0.7%	0.0%	\$12,967.04
CONTRACTOR'S TOTAL:		#DIV/0!	\$1,873,374.82	98%	0.0%	\$1,873,374.82
Other Inclusions		#DIV/0!	\$33,950.62	1.78%	0.0%	\$33,950.62
TOTAL CONSTRUCTION		#DIV/0!	\$1,907,325.44	100%	0.0%	\$1,907,325.44

Spectrum's assumptions, references, qualifications, and allowances in this Estimate are included herein. This includes the attached 'Detail' worksheets and the 'Estimate Notes'.

PROJECT: Sullivan Gate PH. 3 Rehabilitaion
NOTE: Graham Johnson

No.	Description
1	Allowances are identified as ALLOW or ALW , include ALL related costs, and final cost will vary depending on Owner/ Architect decisions. Examples: Carpet, tile, door hardware not yet selected.
2	Contingency is for completion of the Work within the current design ("SCOPE"), including estimating errors and corrective work not due to gross negligence.
3	Scope changes are NOT included unless EXPRESSLY stated (usually as an ALLOWANCE). Owner is advised to carry it's own separate Design Contingency.
4	Design and Consulting Fees , including Surveys and Testing, are excluded unless expressly identified above.
5	Please see specific line item notes in the detailed budget pages for inclusions and exclusions.

Project: Sullivan Gate PH. 3 Rehabilitaion Note: Graham Johnson														ORIGINAL BUDGET DATE: November 5, 2018			
CODE #: DESCRIPTION:		DETAILED ACCOUNTING INFO (B U D G E T)												B U D G E T			
		LABOR				MATERIAL				SUB/OTHER							
		Q	UNIT	\$/UNIT	TOTAL	Q	UNIT	\$/UNIT	TOTAL	Q	UNIT	\$/UNIT	TOTAL				
		QTY	UNIT	\$/UNIT	TOTAL \$												
Div 1.1 General Conditions / Job Services																	
01-00-000	PRECONSTRUCTION SERVICES				0.00				0.00				0.00				\$ -
01-00-100	PRE-CONSTRUCTION: VALUE ANALYSIS - Preconstruction services including Cost Estimating, Value Engineering, Scheduling, Phasing, Logistics, Constructability, Subcontractor Procurement, Subcontractor Validation and all job meetings prior to construction start.		PREV.	CONTRACT	0.00				0.00				0.00				\$ -
01-10-000	CONSTRUCTION MANAGEMENT SERVICES				0.00				0.00				0.00				\$ -
01-10-100	PROJECT MANAGER - 5 hrs/wk	9	MO	1407.25	12,665.25				0.00				0.00	1	LS	12665.25	\$ 12,665.25
	ASSISTANT PROJECT MANAGER - 10 hrs/wk	9	MO	2165	19,485.00				0.00				0.00	1	LS	19485	\$ 19,485.00
01-10-150	SUPERINTENDENT 10 hrs/wk	9	MO	2381.5	21,433.50				0.00				0.00	1	LS	21433.5	\$ 21,433.50
	FOREMAN		NOT	INCLUDED	0.00				0.00				0.00				\$ -
01-10-220	R.O.W. (Right Of Way) Occupancy FEES		NOT	INCLUDED	0.00				0.00				0.00				\$ -
	METER BAGGING		NOT	INCLUDED	0.00				0.00				0.00				\$ -
01-10-300	TEMPORARY UTILITIES				0.00				0.00				0.00				\$ -
	TEMP USAGE: EXISTING ELECTRICITY/ GAS		NOT	INCLUDED	0.00				0.00				0.00				\$ -
	TEMP USAGE: EXISTING WATER		NOT	INCLUDED	0.00				0.00				0.00				\$ -
	TEMPORARY ELECTRICITY- Provide generator and fuel for 9 month construction period				0.00				0.00	9	MO	900	8,100.00	1	LS	8100	\$ 8,100.00
	TEMPORARY FIRE PROTECTION		NOT	INCLUDED	0.00				0.00				0.00				\$ -
	TEMPORARY LIGHTING		NOT	INCLUDED	0.00				0.00				0.00				\$ -
	TEMPORARY NATURAL GAS		NOT	INCLUDED	0.00				0.00				0.00				\$ -
	TEMPORARY CABLE/ PHONE		NOT	INCLUDED	0.00				0.00				0.00				\$ -
	TEMPORARY WATER - Use sprinkler tap				0.00				0.00	1	ALW	1000	1,000.00	1	LS	1000	\$ 1,000.00
01-10-340	ROLL-OFF DUMPSTERS - Included below				0.00				0.00				0.00				\$ -
01-10-350	EQUIPMENT (Rental) - See generator above, other equipment by subs				0.00				0.00				0.00				\$ -
01-10-370	TEMP TOILET				0.00				0.00	9	MO	150	1,350.00	1	LS	1350	\$ 1,350.00
01-10-380	BARRICADES/ PED & ROW PROTECTION				0.00				0.00				0.00				\$ -
	PROTECTIVE WALKWAYS		NOT	INCLUDED	0.00				0.00				0.00				\$ -
	TRAFFIC CONTROL		NOT	INCLUDED	0.00				0.00				0.00				\$ -
01-10-390	TEMP FENCE/ GATES - 2 month cost with screening				0.00				0.00	1	LS	3883.5	3,883.50	1	LS	3883.5	\$ 3,883.50
01-10-400	JOB SIGN, SETUP & FACILITIES				0.00				0.00	1	LS	500	500.00	1	LS	500	\$ 500.00
	TEMPORARY PROJECT SIGNAGE				0.00				0.00				0.00				\$ -
	STORAGE TRAILERS - 1 trailer on site for material per drawing notes.				0.00				0.00	9	MO	95	855.00	1	LS	855	\$ 855.00
01-10-450	SAFETY				0.00				0.00				0.00				\$ -
	SAFETY CONSULTANT				0.00				0.00	9	MO	175	1,575.00	1	LS	1575	\$ 1,575.00
	FIRST AID SUPPLIES/ SAFETY EQUIPMENT				0.00				0.00	1	LS	525	525.00	1	LS	525	\$ 525.00
	JOB FIRE EXTINGUISHERS				0.00				0.00	1	LS	380	380.00	1	LS	380	\$ 380.00
	SECURITY - Nightly site patrol - 4 hours mobile patrol per-night to ensure no camping and or site use outside of working hours.				0.00				0.00	0	MO	5040	0.00				\$ -
01-10-500	JOB CONSUMABLES/ REPAIRS				0.00				0.00	9	MO	250	2,250.00	1	LS	2250	\$ 2,250.00
01-10-550	SCAFFOLDING/ HOISTING		BY	SUBS	0.00				0.00				0.00				\$ -
	CRANE PICKS/ BOOM LIFTS		BY	SUBS	0.00				0.00				0.00				\$ -
	MSC SCAFFOLDING		BY	SUBS	0.00				0.00				0.00				\$ -

Project: Sullivan Gate PH. 3 Rehabilitaion Note: Graham Johnson														ORIGINAL BUDGET DATE: November 5, 2018					
CODE #: DESCRIPTION:		DETAILED ACCOUNTING INFO (B U D G E T)												B U D G E T					
		LABOR				MATERIAL				SUB/OTHER									
		Q	UNIT	\$/UNIT	TOTAL	Q	UNIT	\$/UNIT	TOTAL	Q	UNIT	\$/UNIT	TOTAL						
		QTY	UNIT	\$/UNIT	TOTAL \$														
01-10-580	MOBILIZATION/ OPEN/ CLOSE JOB				0.00				0.00	1	LS	500	500.00	1	LS	500	\$	500.00	
01-10-610	PARKING - Park in city lot adjacent to project site				0.00				0.00				0.00				\$	-	
01-10-650	FREIGHT				0.00				0.00				0.00				\$	-	
01-10-700	TEMPORARY ENCLOSURES		NOT	INCLUDED	0.00				0.00				0.00				\$	-	
	TEMP COVER FOR OPENINGS/ STAIRS/ HOLES		NOT	INCLUDED	0.00				0.00				0.00				\$	-	
	RAIN TARPS/ TEMP ROOF		NOT	INCLUDED	0.00				0.00				0.00				\$	-	
01-10-720	WINTER PROTECTION / TEMP HEAT		NOT	INCLUDED	0.00				0.00				0.00				\$	-	
01-10-850	MATERIALS HANDLING				0.00				0.00	9	MO	974.25	8,768.25	1	LS	8768.25	\$	8,768.25	
01-10-860	PROGRESSIVE CLEANUP / TRASH HAUL				0.00				0.00	9	MO	974.25	8,768.25	1	LS	8768.25	\$	8,768.25	
01-10-870	FINAL CLEAN		INCL	ABOVE	0.00				0.00				0.00				\$	-	
01-10-880	JOBSITE OFFICE				0.00				0.00				0.00				\$	-	
	OFFICE: TRAILER, USE BUILDING or OFFICE BUILD-OUT		NOT	INCLUDED	0.00				0.00				0.00				\$	-	
	TEMP POWER		SEE	ABOVE	0.00				0.00				0.00				\$	-	
	TEMP PHONE/ CABLE		NOT	INCLUDED	0.00				0.00				0.00				\$	-	
	OFFICE SUPPLIES				0.00				0.00				0.00				\$	-	
	MOBILE PHONE/ LAPTOP/ PRINTER				0.00				0.00	9	MO	175	1,575.00	1	LS	1575	\$	1,575.00	
	POSTAGE/ SHIPPING/ COURRIER				0.00				0.00				0.00				\$	-	
	BLUEPRINTING				0.00				0.00	1	LS	500	500.00	1	LS	500	\$	500.00	
01-10-900	JOB CLOSEOUT: PUNCH/ AS-BUILTS/ O&M/ ETC.				0.00				0.00	1	LS	3600	3,600.00	1	LS	3600	\$	3,600.00	
01-10-950	ACCOMMODATIONS (OUT OF TOWN)				0.00				0.00				0.00				\$	-	
					0.00				0.00				0.00				\$	-	
Div 1.1 General Conditions / Job Services		LABOR SUBTOTAL:				53,583.75	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				44,130.00	TOTAL:		\$97,713.75
Div 1.9 Bldng. Permit / Fees / Insurance / Taxes																			
01-90-100	BUILDING PERMIT (50% of ALL WORK)	PER RFP	NOT	INCLUDED	0.00				0.00				0.00				\$	-	
	Plan Review Fee	PER RFP	NOT	INCLUDED	0.00				0.00				0.00				\$	-	
01-90-150	USE TAX ON MATERIALS = 50% OF ALL WORK	PER RFP	NOT	INCLUDED	0.00				0.00				0.00				\$	-	
01-90-200	BUILDER'S RISK INSURANCE/ SPECIAL INSURANCE - Included in General Liability premium for preconstruction/mobilization				0.00				0.00				0.00				\$	-	
01-90-250	LICENSED SURVEY - Site Survey ALLOWANCE to locate grades for rough grade/demo, staking for new pavements & concrete.				0.00				0.00	1	ALW	5000	5,000.00	1	LS	5000	\$	5,000.00	
01-90-260	SOILS/ CONCRETE TESTING		NOT	INCLUDED	0.00				0.00	1	ALW	7500	7,500.00	1	LS	7500	\$	7,500.00	
	SPECIAL INSPECTIONS (i.e. welding, etc.)		NOT	INCLUDED	0.00				0.00				0.00				\$	-	
01-90-300	ENGINEERING (nic elsewhere)		NOT	INCLUDED	0.00				0.00				0.00				\$	-	
					0.00				0.00				0.00				\$	-	
Div 1.9 Bldng. Permit / Fees / Insurance / Taxes		LABOR SUBTOTAL:				0.00	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				12,500.00	TOTAL:		\$12,500.00
Div 2.0 Sitework / Utility Install																			
	UTILITY/ TAP FEES (EXCLUDING INSTALLATION)				0.00				0.00				0.00				\$	-	
02-01-100	EXCAVATION - rough grade to expose terracotta foundations for masonry scope to commence. Includes work by hand around Linden trees where shallow roots may exist and disposal/hauling of all material necessary for new grades adjacent to wall for Sta-Lok paving.				0.00				0.00	1	BID	6279	6,279.00	1	LS	6279	\$	6,279.00	

Project: Sullivan Gate PH. 3 Rehabilaition Note: Graham Johnson													ORIGINAL BUDGET DATE: November 5, 2018																				
CODE #: DESCRIPTION:		DETAILED ACCOUNTING INFO (B U D G E T)												B U D G E T																			
		LABOR				MATERIAL				SUB/OTHER																							
		Q	UNIT	\$/UNIT	TOTAL	Q	UNIT	\$/UNIT	TOTAL	Q	UNIT	\$/UNIT	TOTAL																				
QTY	UNIT	\$/UNIT	TOTAL \$																														
02-01-150	FILL/ HAUL - removal of soil/sod included above				0.00				0.00				0.00					\$	-														
02-01-200	FINE GRADE - Prep for sidewalks and StaLock paving				0.00				0.00	1	ALW	5000	5,000.00	1	LS	5000		\$	5,000.00														
02-01-700	CONCRETE PAVEMENTS -Included below				0.00				0.00				0.00					\$	-														
02-01-750	ASPHALT PAVEMENTS - Sta-Lok paving at wall base including aggregate base prep, soil fabric and topping material				0.00				0.00	1	BID	20000	20,000.00	1	LS	20000		\$	20,000.00														
02-01-760	PARKING STOPS/ STRIPES/ ACCESSORIES				0.00				0.00				0.00					\$	-														
02-01-800	LANDSCAPING - Plantings Per Plan including trees, 1 and 5 gallon plants, weed fabric and mulch, overseeding and equipment/general conditions for landscaper.				0.00				0.00	1	BID	23316.95	23,316.95	1	LS	23316.95		\$	23,316.95														
	NEW SOD AT CONSTRUCTION AREA				0.00				0.00	1	BID	32605	32,605.00	1	LS	32605		\$	32,605.00														
	TREES - Trim Linden Trees per plan - included in precon. Tree protection during construction				0.00				0.00	1	LS	1750	1,750.00	1	LS	1750		\$	1,750.00														
02-01-830	SITE ACCESSORIES - Benches included in masonry scope below, lighting in electrical below.				0.00				0.00				0.00					\$	-														
02-01-840	SPRINKLER/ IRRIGATION SYSTEM - Irrigation per sheet L1.1				0.00				0.00	1	LS	6025	6,025.00	1	LS	6025		\$	6,025.00														
02-01-850	FENCING - See Div. 1 above				0.00				0.00				0.00					\$	-														
					0.00				0.00				0.00					\$	-														
Div 2.0 Sitework / Utility Install		LABOR SUBTOTAL:				0.00				MATERIAL SUBTOTAL:				0.00				SUB/OTHER SUBTOTAL:				94,975.95				TOTAL:				\$94,975.95			
Div 2.1 Demolition																																	
02-10-100	DEMOLITION - Site demo of existing concrete for removal per demo plan. Tree and sod removal already completed or carried above.				0.00				0.00	1	BID	2282.75	2,282.75	1	LS	2282.75		\$	2,282.75														
02-10-450	DUMPSTERS - For demo of masonry beyond restoration and disposal of shipping materials.				0.00				0.00	12	EA	315	3,780.00	1	LS	3780		\$	3,780.00														
02-10-470	TRASH HAUL - Dumpsters included above				0.00				0.00				0.00					\$	-														
02-10-570	CONCRETE BREAK/ HAUL - Included above				0.00				0.00				0.00					\$	-														
02-10-590	CONCRETE CUT/ CORE - Included above				0.00				0.00				0.00					\$	-														
					0.00				0.00				0.00					\$	-														
Div 2.1 Demolition		LABOR SUBTOTAL:				0.00				MATERIAL SUBTOTAL:				0.00				SUB/OTHER SUBTOTAL:				6,062.75				TOTAL:				\$6,062.75			
Div 2.2 Asbestos / Hazardous Material Abatement																																	
02-20-100	Asbestos Abatement		NOT	INCLUDED	0.00				0.00				0.00					\$	-														
02-20-200	Lead Based Paint Abatement		NOT	INCLUDED	0.00				0.00				0.00					\$	-														
	DISPOSAL OF LBP RESIDUE		NOT	INCLUDED	0.00				0.00				0.00					\$	-														
					0.00				0.00				0.00					\$	-														
Div 2.2 Asbestos / Hazardous Material Abatement		LABOR SUBTOTAL:				0.00				MATERIAL SUBTOTAL:				0.00				SUB/OTHER SUBTOTAL:				0.00				TOTAL:				\$-			
Div 2.3 Site Structure / Parking Structure																																	
02-30-100	None				0.00				0.00				0.00					\$	-														
					0.00				0.00				0.00					\$	-														
Div 2.3 Site Structure / Parking Structure		LABOR SUBTOTAL:				0.00				MATERIAL SUBTOTAL:				0.00				SUB/OTHER SUBTOTAL:				0.00				TOTAL:				\$-			
Div 3.0 Concrete																																	
03-01-100	CONCRETE				0.00				0.00				0.00					\$	-														

Project: Sullivan Gate PH. 3 Rehabilitaion														ORIGINAL BUDGET DATE:						
Note: Graham Johnson														November 5, 2018						
CODE #:	DESCRIPTION:	DETAILED ACCOUNTING INFO (B U D G E T)												B U D G E T						
		LABOR				MATERIAL				SUB/OTHER				QTY	UNIT	\$/UNIT	TOTAL \$			
		Q	UNIT	\$/UNIT	TOTAL	Q	UNIT	\$/UNIT	TOTAL	Q	UNIT	\$/UNIT	TOTAL							
	Concrete mow edge with integral light bases				0.00				0.00	1	BID	7675	7,675.00	1	LS	7675	\$ 7,675.00			
	Sidewalk and new flatwork at statue/columns including ADA ramp and new bench pads.				0.00				0.00	1	LS	12868	12,868.00	1	LS	12868	\$ 12,868.00			
	MiraCoat at statue and gateway base where concrete flatwork meets existing foundations.				0.00				0.00	1	ALW	1000	1,000.00	1	LS	1000	\$ 1,000.00			
	Allowance for repair of existing flatwork due to required access for heavy delivery of masonry and forklift movement.				0.00				0.00	1	ALW	7500	7,500.00	1	LS	7500	\$ 7,500.00			
					0.00				0.00				0.00				\$ -			
Div 3.0 Concrete		LABOR SUBTOTAL:				0.00	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				29,043.00			TOTAL:	\$29,043.00
Div 4.0 Masonry																				
04-01-600	MASONRY RESTORATION				0.00				0.00				0.00				\$ -			
	Terracotta Material from Gladding				0.00				0.00	1	BID	441714.3	441,714.30	1	LS	441714.3	\$ 441,714.30			
	BRS labor, material and overhead for restoration of masonry and monuments				0.00				0.00	1	BID	817925.5	817,925.54	1	LS	817925.54	\$ 817,925.54			
	Restore terracotta at east entry statue columns and base				0.00				0.00	1	BID	76506	76,506.00	1	LS	76506	\$ 76,506.00			
	Restore pioneer men statue				0.00				0.00	1	BID	32657	32,657.00	1	LS	32657	\$ 32,657.00			
					0.00				0.00				0.00				\$ -			
Div 4.0 Masonry		LABOR SUBTOTAL:				0.00	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				1,368,802.84			TOTAL:	\$1,368,802.84
Div 5.0 Steel / Metals																				
05-01-100	ORNAMENTAL METALS - Metal trellise between wall and statue column, fabricated and installed.				0.00				0.00	1	BID	15815	15,815.00	1	LS	15815	\$ 15,815.00			
					0.00				0.00				0.00				\$ -			
Div 5.0 Steel / Metals		LABOR SUBTOTAL:				0.00	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				15,815.00			TOTAL:	\$15,815.00
Div 6.0 Rough Carpentry																				
	None				0.00				0.00				0.00				\$ -			
Div 6.0 Rough Carpentry		LABOR SUBTOTAL:				0.00	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				0.00			TOTAL:	\$-
Div 6.2 Finish Carpentry / Millwork																				
	None				0.00				0.00				0.00				\$ -			
Div 6.2 Finish Carpentry / Millwork		LABOR SUBTOTAL:				0.00	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				0.00			TOTAL:	\$-
Div 7.0 Roof / Thermal Systems																				
	None				0.00				0.00				0.00				\$ -			
Div 7.0 Roof / Thermal Systems		LABOR SUBTOTAL:				0.00	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				0.00			TOTAL:	\$-
Div 8.0 Doors / Windows																				
	None				0.00				0.00				0.00				\$ -			
Div 8.0 Doors / Windows		LABOR SUBTOTAL:				0.00	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				0.00			TOTAL:	\$-
Div 9.0 Finishes																				
	None				0.00				0.00				0.00				\$ -			
GYP/PLASTER/ MTL STUDS SUBTOTAL						0.00					0.00					0.00			\$ -	
	None				0.00				0.00				0.00				\$ -			
CERAMIC TILE SUBTOTAL						0.00					0.00					0.00			\$ -	
	None				0.00				0.00				0.00				\$ -			

Project: Sullivan Gate PH. 3 Rehabilitaion Note: Graham Johnson														ORIGINAL BUDGET DATE: November 5, 2018					
CODE #:	DESCRIPTION:	DETAILED ACCOUNTING INFO (B U D G E T)												B U D G E T					
		LABOR				MATERIAL				SUB/OTHER				QTY	UNIT	\$/UNIT	TOTAL \$		
		Q	UNIT	\$/UNIT	TOTAL	Q	UNIT	\$/UNIT	TOTAL	Q	UNIT	\$/UNIT	TOTAL						
ACOUSTIC CEILING SUBTOTAL					0.00				0.00				0.00				\$ -		
	None				0.00				0.00				0.00				\$ -		
FLOOR FINISH: MSC & RES BASE SUBTOTAL					0.00				0.00				0.00				\$ -		
	None				0.00				0.00				0.00				\$ -		
CARPET/ PAD SUBTOTAL					0.00				0.00				0.00				\$ -		
	None				0.00				0.00				0.00				\$ -		
FINAL CLEAN SUBTOTAL					0.00				0.00				0.00				\$ -		
	None				0.00				0.00				0.00				\$ -		
PAINT/ WALL COVERING SUBTOTAL					0.00				0.00				0.00				\$ -		
Div 9.0 Finishes		LABOR SUBTOTAL:				0.00	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				0.00		TOTAL:	\$-
Div 10.0 Specialties																			
	None				0.00				0.00				0.00				\$ -		
Div 10.0 Specialties		LABOR SUBTOTAL:				0.00	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				0.00		TOTAL:	\$-
DIV 11.0 Appliances																			
	None				0.00				0.00				0.00				\$ -		
DIV 11.0 Appliances		LABOR SUBTOTAL:				0.00	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				0.00		TOTAL:	\$-
DIV 12.0 Furnishings																			
	None				0.00				0.00				0.00				\$ -		
DIV 12.0 Furnishings		LABOR SUBTOTAL:				0.00	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				0.00		TOTAL:	\$-
Div 14.0 Elevator																			
	None				0.00				0.00				0.00				\$ -		
Div 14.0 Elevator		LABOR SUBTOTAL:				0.00	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				0.00		TOTAL:	\$-
Div 15.1 Plumbing																			
	None				0.00				0.00				0.00				\$ -		
Div 15.1 Plumbing		LABOR SUBTOTAL:				0.00	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				0.00		TOTAL:	\$-
Div 15.3 Heat / Vent / Cool																			
	None				0.00				0.00				0.00				\$ -		
Div 15.3 Heat / Vent / Cool		LABOR SUBTOTAL:				0.00	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				0.00		TOTAL:	\$-
Div 15.4 Fire Sprinkler																			
	None				0.00				0.00				0.00				\$ -		
Div 15.4 Fire Sprinkler		LABOR SUBTOTAL:				0.00	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				0.00		TOTAL:	\$ -
Div 16.0 Electrical																			
	ELECTRICAL - New branch lighting, trenching, conduit, timeclock lighting control system and lighting fixtures.				0.00				0.00	1	BID	63109	63,109.00	1	LS	63109	\$ 63,109.00		
					0.00				0.00				0.00				\$ -		
Div 16.0 Electrical		LABOR SUBTOTAL:				0.00	MATERIAL SUBTOTAL:				0.00	SUB/OTHER SUBTOTAL:				63,109.00		TOTAL:	\$63,109.00
TOTAL (Divisions 1-16)		LABOR TOTAL:				53,583.75	MATERIAL TOTAL:				0.00	SUB/OTHER TOTAL:				1,634,438.54			\$1,688,022.29
Div 70.0 Construction Contingency		WARNING! Contingency not pulling from budget subtotal												1	LS	52852.22	\$52,852.22		
TOTAL (Divisions 1-16 + 70)														*****				\$1,740,874.51	
DIV 70.0 Owner's Contingency		WARNING! Contingency not pulling from budget subtotal												1	LS	47979.12	\$47,979.12		
TOTAL (Divisions 1-16 + 70)														*****				\$1,788,853.63	

Project: Sullivan Gate PH. 3 Rehabilitaion Note: Graham Johnson														ORIGINAL BUDGET DATE: November 5, 2018			
CODE #:	DESCRIPTION:	DETAILED ACCOUNTING INFO (B U D G E T)												B U D G E T			
		LABOR				MATERIAL				SUB/OTHER				QTY	UNIT	\$/UNIT	TOTAL \$
		Q	UNIT	\$/UNIT	TOTAL	Q	UNIT	\$/UNIT	TOTAL	Q	UNIT	\$/UNIT	TOTAL				
Div 80.0	Contractor's Fee	WARNING! Fee not pulling total of budget + contingency												4	%	1788853.63	\$71,554.15
TOTAL (Divisions 1-16, 70 + 80)														*****		\$1,860,407.78	
Div 90.0	General Liability Insurance													0.697	%	1860407.78	\$12,967.04
CONTRACTOR'S TOTAL:														*****		\$1,873,374.82	
OTHER INCLUSIONS																	
	PAYMENT & PERFORMANCE BOND	PAYMENT & PERFORMANCE BOND												1.5	%	1873374.82	\$28,100.62
	SPECIAL INSURANCES	SPECIAL INSURANCES												Excluded	%	1873374.82	\$-
	TEXTURA PROJECT BILLING FEE	TEXTURA PROJECT BILLING FEE												1	LS	\$5,850.00	\$5,850.00
	OWNERS SCOPE CHANGES	OWNERS SCOPE CHANGES												Excluded	LS	0	\$-
OTHER INCLUSIONS TOTAL																	\$33,950.62
GRAND TOTAL														*****		\$1,907,325.44	



EXHIBIT N

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

01/17/2019

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Moody Insurance Agency, Inc. 8055 East Tufts Avenue Suite 1000 Denver CO 80237		CONTACT NAME: Brandie Zuckerman, CIC PHONE (A/C, No, Ext): (303) 824-6600 FAX (A/C, No): (303) 370-0118 E-MAIL ADDRESS: brandie.zuckerman@moodyins.com	
		INSURER(S) AFFORDING COVERAGE	
		INSURER A: Selective Insurance Co of America	
		INSURER B: United Specialty Ins Co	
		INSURER C: Pinnacol Assurance	
		INSURER D: Hanover Insurance Group	
		INSURER E:	
		INSURER F:	

COVERAGES

CERTIFICATE NUMBER: 19-19 Master

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY	Y		S230390900	11/01/2018	11/01/2019	EACH OCCURRENCE	\$ 1,000,000
	<input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	\$ 500,000
							MED EXP (Any one person)	\$ 15,000
							PERSONAL & ADV INJURY	\$ 1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	\$ 2,000,000
	<input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC						PRODUCTS - COMP/OP AGG	\$ 2,000,000
	OTHER:							\$
A	AUTOMOBILE LIABILITY			S230390900	11/01/2018	11/01/2019	COMBINED SINGLE LIMIT (Ea accident)	\$ 1,000,000
	<input checked="" type="checkbox"/> ANY AUTO						BODILY INJURY (Per person)	\$
	<input type="checkbox"/> OWNED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS NON-OWNED AUTOS ONLY						BODILY INJURY (Per accident)	\$
	<input type="checkbox"/> HIRED AUTOS ONLY <input type="checkbox"/>						PROPERTY DAMAGE (Per accident)	\$
								\$
B	<input type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> EXCESS LIAB			BTN1895007	11/01/2018	11/01/2019	EACH OCCURRENCE	\$ 5,000,000
	<input type="checkbox"/> CLAIMS-MADE						AGGREGATE	\$ 5,000,000
	DED <input checked="" type="checkbox"/> RETENTION \$ 0							\$
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY	Y/N	N/A	4189144	01/01/2019	11/01/2019	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH)						E.L. EACH ACCIDENT	\$ 1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	\$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	\$ 1,000,000
D	Builders Risk			IH4D13140002	11/01/2018	11/01/2019	Single Loc Limit	10,000,000
	Temporary Location						250,000	
	Transit Limit						250,000	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

RE: Sullivan Gateway Phase 3 Rehabilitation

CERTIFICATE HOLDER

CANCELLATION

City of Denver 201 W Colfax Ave Denver CO 80202	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
	AUTHORIZED REPRESENTATIVE

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EXHIBIT N

AGENCY CUSTOMER ID: _____

LOC #: _____



ADDITIONAL REMARKS SCHEDULE

Page ____ of ____

AGENCY Moody Insurance Agency, Inc.		NAMED INSURED Spectrum General Contractors, Inc.
POLICY NUMBER		
CARRIER	NAIC CODE	EFFECTIVE DATE:

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,**FORM NUMBER:** _____ **FORM TITLE:** : Notes

CONTRACTUAL LIABILITY APPLIES PER POLICY TERMS AND CONDITIONS

Additional Named Insureds Included on Policy:

B&O Company, LLC
 Grand Spectrum, LLC
 The Bio Demolition LLP
 Colorado Historic Millwork, LLP
 Future Steel, LLP

General Liability:

CG 7988 0116 Form Attached Includes:

Blanket Additional Insured status applies only to the extent provided in form CG 7988 0116 when required by written contract.
 Blanket Waiver of Subrogation applies only to the extent provided in form CG 7300 0116 when required by written contract.
 Primary and Non-Contributory status only to the extent provided in form CG 7300 0116 when required by written contract.

CG 2504 0509 Form Attached Includes:

Designated Location General Aggregate applies only to the extent provided in form CG 2504 0509 when required by written contract.

CG 2503 0509 Form Attached Includes:

Designated Project General Aggregate applies only to the extent provided in form CG 2503 0509 when required by written contract.

Auto Liability:

CA 7809 0116 Form Attached Includes:

Blanket Additional Insured status applies only to the extent provided in form CA 7809 0116 when required by written contract.
 Blanket Waiver of Subrogation applies only to the extent provided in form CA 7809 0116 when required by written contract.
 Primary and Non-Contributory status only to the extent provided in form CA 7809 0116 when required by written contract.

Excess Liability:

Excess Liability policy is on a follow form basis for the following underlying insurance coverages: General Liability, Automobile Liability, and Employers Liability. Additional insured status will follow when required by written contract including Primary and Non-Contributory status when required by written contract.

Worker's Compensation:

359-B Form Attached Includes Blanket Waiver of Subrogation. Status applies when required by written contract.

Inland Marine

Leased/Rented Tools: 100,000 Limit – 50,000 per item

Selective Insurance Company – NAIC 12572 – Eff 11/01/2018 – 11/01/2019

Pollution Liability

Policy Number: PCM184962408 - 1,000,000/2,000,000

Great American Insurance Company – NAIC 16691 – Eff 01/01/2019 – 11/01/2019

Professional Liability

Policy Number: PCM184962408 - 1,000,000/2,000,000

Great American Insurance Company – NAIC 16691 – Eff 01/01/2019 – 11/01/2019

IMPORTANT:

The policy forms referenced will be sent via email only. To obtain copies, please send your request with the email address to certrequest@moodyins.com.