



TOWN OF YORKTOWN

BID AND SPECIFICATIONS

FOR THE

TOWN HALL ENTRY RENOVATION

BID #22-9

Matthew Slater
Town Supervisor

Daniel Ciarcia, P.E.
Town Engineer

Dated: July 5, 2022

**TOWN OF YORKTOWN
TOWN HALL FRONT ENTRY RENOVATION BID #22-9**

INSTRUCTIONS TO BIDDERS

NOTICE IS HERE GIVEN that sealed bids will be received by the Town Clerk, Town of Yorktown, Yorktown, NY until 11:30 A.M. on July 29, 2022 at Town Hall, 363 Underhill Avenue, Yorktown Heights, N.Y. 10598 for the **Town Hall Front Entry Renovation, Bid #22-9**. Copies of the Bid Documents will be available in the office of the Town of Yorktown Town Clerk located at 363 Underhill Avenue, Yorktown Heights, NY 10598. A completed Bid Proposal Form must be returned to the Town Clerk, 363 Underhill Avenue, Yorktown Heights, NY 10598, marked: **“Bid: Town Hall Entry Renovation – Bid #22-9.”**

The Bid Documents consists of the following documents:

1. **Instructions to Bidders**
2. **Part One** Bid Proposal Form
3. **Part Two** General Terms and Conditions of Bid
4. **Part Three** Specifications
5. **Part Four** Addenda, if any
6. **Non-Collusive Bidding Certificate**

Wherever in the Bid Documents any section or paragraph is stamped "VOID", only the section(s) or paragraph(s) so stamped are void. All other sections(s) and paragraph(s) remain in full force and effect.

A submitted bid will consist of

1. one original completed **Bid Proposal Form**, signed on behalf of Bidder with information for all blanks supplied, and a detailed listing of any exceptions taken by Bidder; and
2. a signed and notarized Non-Collusive Bidding Certificate.

Diana L. Quast
Town Clerk
Town of Yorktown

**TOWN OF YORKTOWN
TOWN HALL FRONT ENTRY RENOVATION**

PART ONE

BID PROPOSAL FORM

The Town of Yorktown seeks bids from qualified parties:

Town Hall Front Entry Renovation

BIDDER'S OFFICIAL CORPORATE NAME (required, if bidder is a corporation):

BIDDER'S D/B/A NAME (if any) _____

Dollar Amount: \$ _____

Amount in words: _____

The price(s) set forth above shall remain valid for one (1) year from the date of bid award.

Prices in the bid must cover all of bidder's costs. There shall be no additional charges to the Town for delivery, training, set-up, etc.

Name of person authorized to submit bid for bidder:

Signed: _____

[Signature of authorized person, if not a corporate officer attach corporate resolution authorizing submission of bid.]

TITLE of authorized person: _____

BIDDER'S CORPORATE NAME:

BIDDER CONTACT INFORMATION:

PRINT NAME: _____

TITLE: _____

Address: _____ State: _____ Zip: _____

Phone: _____

Fax: _____

Email: _____@_____

-END OF BID PROPOSAL FORM-

**TOWN OF YORKTOWN
SERVICES AND PUBLIC WORKS CONTRACTS BID**

PART TWO

General Terms and Conditions of Bid

<u>Section Numbers</u>	<u>Heading</u>
Section 1.	Bid Proposal Form
Section 2.	Pre-Bid Site Inspection
Section 3.	Quality and Samples
Section 4.	Request for information and/or clarification of the Bid Documents
Section 5.	Non-Collusion
Section 6.	Late Bids
Section 7.	Bid Opening
Section 8.	Acceptance and Rejection
Section 9.	Appeal of Determination of Non-Responsiveness and Non-Responsibility
Section 10.	Award
Section 11.	Notice of Award
Section 12.	Performance And Payment Bond
Section 13.	Assignment Prohibited
Section 14.	Special Requirements
Section 15.	Purchase of Additional Quantities of Bid Items
Section 16.	Contractor's Subcontracts and Material Lists
Section 17.	Representative Always Present
Section 18.	Performance
Section 19.	Insurance Requirements
Section 20.	Indemnification

<u>Section Numbers</u>	<u>Heading</u>
Section 21.	Delivery Point
Section 22.	Date of Delivery
Section 23.	Damages
Section 24.	Warranty/Guarantee
Section 25.	Breach of Contract/Termination
Section 26.	Prevailing Wage Rates and Supplements
Section 27.	Estimates and Payments
Section 28.	Payments to Subcontractors and Materialmen by Contractor
Section 29.	Change in Contract Price
Section 30.	Proper Method of Work and Materials
Section 31.	Utilities and Service Lines
Section 32.	Protection, Existing Structures
Section 33.	Acceleration of the Work
Section 34.	Stopping Work
Section 35.	Change in the Contract Time
Section 36.	Disputed Work – Notice of Claims For Damages

Section 1. Bid Proposal Form

- 1.1** The bidder shall complete the Bid Proposal Form by filling in the unit price and the total price in the appropriate designated spaces. Unit price and total price of each item bid shall be written legibly in ink, or typed. All bids shall be signed in ink. Any erasures or alterations shall be initialed in ink by the signer. The completed Bid Proposal Form shall be submitted, along with any documentation in support of the bid proposal if required by the Bid Documents, in a sealed envelope addressed as required in the Invitation to Bidders on or before the time and at the place so designated. Any Bid Proposal Form which has been materially altered in any way may render the bid nonresponsive and the bid rejected.
- 1.2** In the event of a discrepancy between the unit price and the total price of the Bid Proposal Form, the unit price will prevail. In the event of a discrepancy between the written bid amount and the numerical bid amount, the written amount will take precedence and be controlling as to the amount of the Bid. All items not bid shall be indicated as “not bid” in the total price space. When bids are requested on a lump sum basis, bidder must bid on each item in the lump sum group. Any bidder desiring to bid “no charge” on an item in a group must so indicate.
- 1.3** Failure to comply with the provisions of this section may be grounds for rejection of the bid proposal.
- 1.4** Correction or withdrawal of a bid because of an inadvertent, non-judgmental mistake in the Bid Proposal Form requires careful consideration to protect the integrity of the competitive bidding process, and to ensure fairness. If the mistake is attributable to an error in judgment, the Bid Proposal Form may not be corrected. Bid correction or withdrawal by reason of the non-judgmental mistake is permissible at the sole discretion of the Town Clerk, but only to the extent that it is not contrary to the interests of the Town or the fair treatment of other bidders.
- 1.5** By signing the Bid Proposal Form, the bidder certifies that:

 - i.** the person whose signature appears below is legally empowered to bind the bidder;
 - ii.** the bidder has read the complete Bid Documents and understands and agrees to all terms and conditions set forth in the Bid Documents;
 - iii.** if accepted by the Town, the bid is guaranteed as written and will be implemented as stated;
 - iv.** By submission of the bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not on the list created pursuant to paragraph (b) of subdivision 3 of section 165-a of the New York State

- 1.6 The bidder understands and agrees that quantities shown on the Bid Proposal Form opposite items of the work for which unit prices have been requested are approximate estimated quantities, and that during the progress of the work the Town may find it advisable and shall have the right to omit portions of the work, and to increase or decrease the shown approximate estimated quantities, or the scope of the whole work; and that the Town reserves the right to add to or take from the total amount of the work up to a limit of thirty (30%) percent of the total amount of the contract based upon the executed contract price for all the specified work.
- 1.7 The bidder shall make no claim for anticipated profits or loss of profits, because of any difference between the quantities of the various classes of work actually done, or of the materials actually furnished, and the original specified scope of work and the shown approximate estimated quantities.
- 1.8 All prices bid include a sum sufficient for the preparation and submission of approved final “As-builts”, record drawings, guarantees, warranties, and operations and maintenance manuals.
- 1.9 All plans and other like records compiled by the contractor in completing the work under this contract shall become the property of the Town. The Contractor may retain copies of each such plan or record for its own use.
- 1.10 The contractor shall secure and pay for all necessary permits for the proper executing and completion of work.
- 1.11 The Town is exempt from all federal, state and local taxes.

Section 2. Pre-Bid Site Inspection

- 2.1 The bidder shall satisfy itself by personal examination of the location of the proposed work and surroundings thereof, and by such other means as it may prefer, as to the scope of the work and the accuracy of the approximate estimated quantities; and shall not at any time after submission of the bid dispute such approximate estimated quantities or assert that there was any misrepresentation by the Town or any misunderstanding by the bidder in regard to the quantity or kind of materials to be furnished, or work to be done. Failure to do so will not relieve a successful bidder contractor (“contractor”) of the obligation to furnish all material and labor necessary to carry out the provisions of the contract documents and to complete the contemplated work for the consideration set forth in its bid.
- 2.2 Unless otherwise stated, the bidder is free and encouraged to examine the work site during normal work hours preceding the submission of the bid. For those bidders

¹ List found at <http://ogs.ny.gov/about/regs/docs/ListofEntities.pdf>.

requesting further clarification of the conditions, an appointment with the Town's representative, can be requested, by contacting the, Town Clerk.

- 2.3 At the time of the opening of bids each bidder will be presumed to have inspected the sites and to have read and to be thoroughly familiar with the Bid Documents.

Section 3. Quality and Samples

- 3.1 All equipment, material and supplies bid upon must conform to the description and specifications set forth in the in the Bid Documents, or their reasonable equivalent.
- 3.2 References in the Bid Documents to type, style, brand or trade name, and catalog are intended to be descriptive only and not restrictive.

Section 4. Request for information or interpretation and/or clarification of the Bid Documents

- 4.1 The bidder shall have seven (7) business days prior to the bid opening date to notify the Town Clerk in writing of any errors or defects in the Bid Documents which would prevent the bidder from providing a responsive bid.
- 4.2 No interpretation of the Bid Documents will be made to any bidder orally by any representative of the Town.
- 4.3 Any request for information or interpretation and/or clarification of the Bid Documents must be addressed in writing to Diana Quast, Yorktown Town Clerk, 363 Underhill Avenue, Yorktown Height, NY 10598, and be submitted not later than five (5) business days prior to the date fixed for the opening of bids.
- 4.4 Any written response to a request for information or interpretation and/or clarification of the Bid Documents shall be issued by Town Clerk and will be incorporated into and made part of the Bid Documents and will be made available in the same manner and method as the Bid Documents. The Town Clerk's decision shall be final and binding on all parties. The failure of any bidder to receive such Addenda will not relieve the contractor of any obligation to comply with the terms and conditions of the Addenda.
- 4.5 The Bid Documents, including the drawings, Bid Documents, have been prepared with care and are intended to show as clearly as is practicable the work required to be done. The bidder must realize however, that construction details cannot always be accurately anticipated and that in executing the work, field conditions may require reasonable modifications in the details of the plans and quantities of work involved. Work under all items in the contract must be carried out to meet these field conditions to the satisfaction of the Town and in accordance with the Bid Documents. The bidder shall not take advantage of any apparent errors or omission in the Bid Documents. In the event the contractor discovers an error or omission in the Bid Documents, it shall immediately notify the Town. The Town will then make such corrections and interpretations as may be deemed necessary for fulfilling the intent of the Bid Documents.

- 4.6 A bidder's failure to request a clarification, interpretation, etc. of any portion of the Bid Documents or to point out any inconsistency therein will preclude such bidder from thereafter claiming any ambiguity, inconsistency, or error which should have been discovered by a reasonably prudent bidder and from asserting any claim for damages arising directly or indirectly therefrom.

Section 5. Non-Collusion

- 5.1 The bidder shall certify that it has complied with all of the requirements stated in the non-collusive bidding certificate by signing the form included in the Bid Documents. Failure by the bidder to complete and sign the non-collusive bidding certificate will constitute grounds for rejection of the bid.

Section 6. Late Bids

- 6.1 All bids received after the deadline date and time stated in the Instructions to Bidders will not be considered and will be returned to the bidder unopened. The bidder assumes the risk of any delay in the mail and the handling of the mail by the employees of the Town. Whether sent by mail or by means of personal delivery, the bidder assumes all responsibility for having the bid delivered on time and to the place specified above.

Section 7. Bid Opening

- 7.1 Sealed bids will be publicly opened on the date and time specified in the Instructions to Bidders. Bids may be read aloud to those persons present when practicable. Any bidder may request to review any submitted Bid Proposal Forms by arranging a mutually convenient time with the Town Clerk.
- 7.2 The prices stated in the Bid Proposal Form are irrevocable until the Notice of Award is issued, unless the bid is withdrawn only after the expiration of sixty (60) days from the bid opening and only in writing received by the Town Clerk and in advance of the issuance of the Notice of Award.

Section 8. Acceptance or Rejection

- 8.1 A responsive bid is one that complies with all material terms and conditions of the Bid Documents.
- 8.2 If the lowest price bid or proposal is found non-responsive, a determination setting in detail and with specificity the reasons for such finding shall be issued by the Town Clerk. A copy of such determination shall be mailed to the non-responsive bidder no later than two (2) business days after the determination is made.
- 8.3 The Town reserves the sole right to waive any informality that is a matter of form rather than substance without prejudice to other bidders and what is in the best interests of the Town. The Town's decision shall be final and binding.

8.4 Any corporation not incorporated under the Laws of New York State, must furnish a copy of its certificate of authority, from the New York State Secretary of State, to do business in the State of New York, in accordance with Article 13 of the New York State Business Corporation Law.

8.5 The Town will consider the qualifications of all bidders and may conduct such investigation as it deems necessary to assist in the evaluation of any bid. The Town reserves the right to reject any bid if the evidence submitted by, or the investigation of such bidder fails to satisfy the Town, in the Town's sole discretion, that it is properly qualified to carry out the obligations of the contract and to complete the contemplated work. In evaluating a bidder's responsibility the Town may consider the following factors:

- i.** financial resources;
- ii.** technical qualifications;
- iii.** experience;
- iv.** organization, material, equipment, facilities, and personnel resources and expertise (or the ability to obtain them) necessary to carry out the work and to comply with required delivery or performance schedules, taking into consideration other business commitments;
- v.** a satisfactory record of performance;
- vi.** a satisfactory record of business integrity;
- vii.** where the contract includes provisions for reimbursement of contractor costs, the existence of accounting and auditing procedures adequate to control property funds, or other assets, accurately delineate costs, and attribute them to their causes; and
- viii.** compliance with requirements for the utilization of small, minority-owned, and women-owned businesses as subcontractors.

8.6 The Town reserves the right to require additional information as it deems appropriate concerning the history of any bidder's performance of prior contracts. The final determination of whether the bidder possesses the requisite experience rests in the sole discretion of the Town. Failure of a bidder to provide relevant information specifically requested by the Town may be grounds for a determination of non-responsive and/or non-responsible.

Section 9. Appeal of Determination of Non-Responsiveness or Non-Responsible

9.1 Any determination that a bid is non-responsive or a bidder is non-responsible may be appealed as set forth herein.

- 9.2 Time Limit; A bidder shall have five (5) business days from receipt of the determination of non-responsiveness or non-responsible to file an appeal with the Town Clerk. Receipt of notice by the bidder shall be deemed to be no later than five (5) business days from the date of mailing or upon delivery, if delivered. Filing of the appeal shall be accomplished by actual delivery of the appeal document to the Town Clerk. The bidder shall also send a copy of its appeal, for informational purposes, to the Town Attorney.
- 9.3 Form and Content; The appeal shall be in writing and shall briefly state all the facts or other basis upon which the bidder contests the finding of non-responsiveness or non-responsible. Supporting documentation, if any, shall be included.
- 9.4 Stay of Award of Contract Pending. Award of the contract shall be stayed pending the determination of the Town Clerk unless the Town Clerk makes a determination that proceeding with the award without delay is necessary to protect substantial Town's interests. Where such a determination is made, the bidder shall be advised of this action in the determination of non-responsiveness or, if the stay is removed at any time after the bidder has been notified of determination of non-responsiveness or non-responsible, notification shall be provided to the bidder no later than two (2) business days after such determination is made. The Town Clerk shall consider the appeal, and may, in his or her sole discretion, meet with the bidder to discuss the merits of the appeal. The Town Clerk shall make a prompt determination with respect to the merits of the appeal, a copy of which shall be sent to the bidder. The Town Clerk's determination shall be final.

Section 10. Award

- 10.1 Town reserves the right to make an award within sixty (60) days after the date of the bid opening, during which period bids may not be withdrawn.
- 10.2 The Award will be made to the responsible and responsive bidder submitting the lowest bid that fully complies with all the specifications stated in the Bid documents.
- 10.3 Town reserves the right to reject all bids and to purchase any or all items on contracts awarded by agencies or departments of the State of New York or of the Town, if such items can be obtained on substantially the same terms, conditions, specifications, and at a lower price.

Section 11. Notice of Award

- 11.1 If the bid is awarded by Town, a written Notice of Award will be issued by the Town Clerk to the contractor. Such Notice of Award will constitute a binding enforceable contract between the contractor and the Town of Yorktown. These General Terms and Conditions shall be incorporated into the contract as material terms.
- 11.2 The Town may issue a Notice of Award based on either Lowest Responsible Bid

or Best Value, in accordance with the 2012 amendments to General Municipal Law § 103, as implemented by Yorktown Town Code Chapter 78 entitled *Procurement for Goods and Services*.

- 11.3** Upon receipt of the Notice of Award the contractor will be required to submit to the Town Clerk a completed W-9 form in addition to any other information or documents required by the Town. Failure to supply a completed W-9 form or such other information or documents required by the Town will invalidate the bid.

Section 12. Performance And Payment Bond

- 12.1** If a Performance and Payment bond is required in accordance with the Instruction to Bidders, the “Bid Bond and Consent of Surety” Form must be executed by the contractor’s Surety Company and submitted to the Town.

Section 13. Assignment Prohibited

- 13.1** The contractor shall not assign, transfer, convey or otherwise dispose of the contract or any part of it or any monies due and payable under the contract, without prior written approval of the Town. If such approvals are granted by the Town, they shall in no way relieve the contractor or from any obligations under the terms of the contract.

Section 14. Special Requirements

- 14.1** Special requirements for any bid may supersede and/or be added to any provision contained in these General Terms and Conditions.

Section 15. Purchase of Additional Quantities of Bid Items

- 15.1** The Town may purchase additional quantities of the bid items at any time during the contract period, for the same price and under the same terms and conditions as set in the Bid Proposal Form.

Section 16. Contractor's Subcontracts And Material Lists

- 16.1** Within fifteen (15) days after execution of the Contract, the contractor shall submit to the Town for approval a list of the subcontractors, materialmen and materials that the contractor plans to use in the performance of the work and statements of the work they are to perform. The format and content of the list shall be in accordance with directives from the Town. No part of the work may be sublet until after the contractor has received the Town’s approval. The contractor shall be fully responsible for all acts and omissions of its subcontractors and persons directly or indirectly employed by them, and the Town’s approval to sublet parts of the work will in no way relieve the contractor of any of its obligations under the Contract. All dealings of the Town with the subcontractors shall be through the contractor..

16.2 The contractor shall insert appropriate clauses in all subcontracts to bind the subcontractors to the contractor by all applicable provisions of the contract documents executed between the contractor and the Town, but this shall not be construed as creating any contractual relationships between subcontractors and the Town. Prior to approval of the subcontractors, the Town has the right to review and recommend changes in the subcontracts. The Town reserves the right to reject any subcontractor proposed by the contractor if in the reasonable opinion of the Town such subcontractor lacks the experience or capability to perform its subcontract work or is otherwise non-responsible.

16.3 The contractor shall insert appropriate clauses in each subcontract that require that if the contractor is terminated by the Town either for default or convenience that at the sole option of the Town the subcontract shall automatically attach to the Town and the subcontractor shall continue without delay or interruption to fully perform all of the obligations required by its subcontract.

Section 17. Representative Always Present

17.1 The contractor in case of its absence from the work shall have a competent representative or foreman present, who shall obey without delay, all instructions of the Town in the prosecution and completion of the work in conformity with the contract, and shall have full authority to supply labor and material immediately.

17.2 The contractor, or its superintendent, shall attend job meetings with the Town for the purpose of discussing expedition, execution and coordination of the work. Job meetings will be scheduled periodically (the first to be prior to commencement of construction) at a time and place designated by the Town.

17.3 The contractor shall not commence any work prior to the first (pre-construction) meeting between the contractor, Town, and other concerned governmental and utility company representatives.

Section 18. Performance

18.1 All work performed and all materials furnished shall be in reasonably close conformity with the lines, grades, cross sections, dimensions and materials requirements, including tolerances, shown in the Bid Documents.

18.2 Plan dimensions and contract specification values are to be considered as the target value to be strived for and complied with as the design value from which any deviations are allowed. It is the intent of the specifications that the materials and workmanship shall be uniform in character and shall conform as nearly as realistically possible to the prescribed target value or to the middle portion of the tolerance range. The purpose of the tolerance range is to accommodate occasional minor variations from the median zone that are unavoidable for practical reasons. When a maximum or minimum value is specified, the production and processing of the material and the performance of the work shall be so controlled that material or work shall not be preponderantly of borderline quality or dimension.

- 18.3** Figured dimensions on the plans shall be given preference over scaled dimensions, but shall be checked by the contractor before starting construction. Information and data on the contract documents shall take precedence in the following order (1) Drawing; Details, Sections, Plans, Notes, General Notes, (2) Technical Specifications, (3) General Specifications. Any errors, omissions or discrepancies shall be brought to the attention of the Town whose decision thereon shall be final.
- 18.4** In the event that the Town determines that the materials or the finished product in which the materials used are not within reasonably close conformity with the Bid Documents but that reasonably acceptable work had been produced, the Town shall then make a determination if the work shall be accepted and remain in place. In this event, the Town will document the basis of acceptance by contract modification, subject to the approval of the Town Board, which will provide for an appropriate adjustment in the contract price for such work or materials as deems necessary.
- 18.5** In the event that the Town determines that the materials or the finished product in which the materials used are not within reasonably close conformity with the Bid Documents and have resulted in an inferior or unsatisfactory product, the work or materials shall be removed and replaced or otherwise corrected by and at the expense of the contractor.
- 18.6** All traffic control devices (signs, signals, markings, and devices placed by the authority of a public body or official having jurisdiction for the purpose of regulating, warning or guiding traffic) shall be in conformity with the latest edition of the New York State Manual of Uniform Traffic Control Devices or other such standard as directed by the Town.
- 18.7** Time being of the essence, the contractor shall take notice that the timely completion of the work called for under the contract is of the greatest importance. The contractor shall commence its work within ten (10) days after "Notice of Award" has been given it by the Town (unless a definite starting date is otherwise stated). Prior to commencing its work, the contractor shall notify the Town, at least forty-eight (48) hours prior to the planned date of its "start".

Section 19. Insurance Requirements

- 19.1** The contractor, upon award of the contract, shall provide at its own cost and expense the following insurance to the Town from insurance companies licensed in the State of New York, carrying a Best's financial rating of "A" or better, which insurance shall be evidenced by certificates and/or policies as determined by the Town.
- 19.2** Each certificate or policy shall require that, thirty (30) days prior to cancellation or material change in the policies, notice thereof shall be given to the Town Clerk by registered mail, return receipt requested, for all of the following stated insurance policies. All such notices shall name the contractor and identify the contract number or description.

19.3 All policies and certificates of insurance shall be approved by the Town prior to the inception of any work.

- i.** Workmen's Compensation: The contractor shall evidence compliance with Workers' Compensation Law, or as otherwise directed by the Town.
- ii.** Commercial General Liability Insurance with minimum limits of liability per occurrence of \$1,000,000 with the Town named as an additional insured.
- iii.** Automobile Liability Insurance with minimum limits of liability per occurrence of \$1,000,000 with the Town named as an additional insured.
- iv.** Additional insurance may be required on an individual basis for extra hazardous contracts and specific service agreements. If such additional insurance is required for a specific contract, that requirement will be described in the Special Requirements of the contract specifications.
- v.** If any of the insurance requirements are not complied with at their renewal dates, payments to the contractor will be withheld until those requirements have been met, or at the option of the Town, the Town may pay the Renewal Premium and withhold such payments from any monies due the contractor.
- vi.** If at any time any of the foregoing policies shall be or become unsatisfactory to the Town, as to form or substance, or if a company issuing any such policy shall be or become unsatisfactory to the Town, the contractor shall upon notice to that effect from the Town, promptly obtain a new policy, submit the same to the Town for approval and submit a certificate thereof as herein above provided. Upon failure of the contractor to furnish, deliver and maintain such insurance as above provided, the contract, at the election of the Town, may be forthwith declared suspended, discontinued or terminated. Failure of the contractor to secure and/or maintain or the taking out and/or maintenance of any required insurance, shall not relieve the contractor from any liability under the contract, nor shall the insurance requirements be construed to conflict with or otherwise limit the obligations of the contractor concerning indemnification.
- vii.** In the event that claims in excess of the insured amounts provided herein, are filed by reason of any operations under the contract, the amount of excess of such claims or any portion thereof, may be withheld from payment due or to become due the contractor until such time as the contractor shall furnish such additional security covering such claims as may be determined by the Town.

Section 20. Indemnification

- 20.1** The contractor hereby agrees to indemnify and save harmless the Town, its officers, employees, elected officials, and agents from and against all liability, loss or damage the Town may suffer, arising directly or indirectly out of the contract between the contractor and the Town. The Contractor further agrees to provide defense for and defend any claims or causes of action of any kind or character directly or indirectly arising out of this Agreement at its sole expense and agrees to bear all other costs and expenses relating thereto. The foregoing provisions shall not be construed to cause the contractor to indemnify the Town, its officers, elected officials, agents or employees from its or their sole negligence.
- 20.2** Neither the acceptance of the completed work nor payment therefore shall release the Contractor from its obligation under this section.

Section 21. Delivery Point

- 21.1** Shipping of any products shall be FOB Destination. Delivery shall be at the location set forth in the Specifications except on national, state or local holidays when Town buildings are closed. Bidder shall be responsible to verify that the appropriate Town building for delivery is open prior to delivering items. All bid items shall be unloaded and placed within the particular Town building, at points of delivery, and in quantities, as directed by the Town. Any costs incurred by the Town or bidder due to the failure of bidder to comply with this requirement will be the responsibility of bidder. Bidder should be prepared to furnish proof of delivery, if requested by Town. Deliveries shall be made in accordance with the specifications, and shall be made Monday through Friday from 8 a.m. to 2 p.m. unless otherwise stated in the Specific Specifications.
- 21.2** If bidder is shipping bid items to Town using a third-party carrier (US Postal Service, UPS, FedEx), there shall be no additional shipping charge to the Town.
- 21.3** Delivery will not be complete until the good are inspected and accepted by the Town.

Section 22. Date of Delivery

- 22.1** Delivery of all materials included under this bid shall be made not later than the date specified in the Bid Documents or Project Schedule. If contractor cannot meet the delivery date specified in Bid Documents or Project Schedule, contractor shall state on the bid form the proposed date of delivery and such date will considered when determining responsiveness in awarding the bid.

Section 23. Damages

- 23.1** The contractor shall be fully responsible for shipping and delivery of materials specified in the Bid Documents or Project Schedule in an undamaged condition. Town will not consider the carrier responsible for damaged or delayed deliveries.

Any bid item damaged or broken when delivered to Town shall be replaced immediately by contractor at no cost to the Town.

Section 24. Warranty/Guarantee

24.1 It is the intent of the Bid Documents to require first-class work and materials and any work not fully covered herein Bid Documents shall be interpreted to require first-class work and materials, and such interpretations shall be binding upon the Contractor. The contractor shall be fully responsible for performance of work in a satisfactory manner with satisfactory results in the discretion of the Town quality materials.

24.2 Contractor is deemed to warrant and guarantee all work performed under this agreement.

24.3 Unless otherwise stated in other parts of the specifications, all work performed or goods supplied under the contract shall be guaranteed by the contractor against all defects resulting from the use of inferior materials, equipment or workmanship, for a period of one (1) year from the date of final completion and acceptance of the work, which shall be defined as the date of the Town's approval of the final Certificate for Payment or from the date the Town takes possession and makes full use of the constructed facility.

24.4 Any goods furnished must be standard, new, latest model of the regular stock product, as required by the specifications, with parts regularly used for the type of equipment offered.

24.5 No attachment or part will be substituted or applied contrary to manufacturer's recommended and standard practice. All regularly manufactured stock electrical items must bear the label of the Underwriters Laboratories, Inc. Any equipment, part or constructed item which is or becomes defective during the guarantee period shall be replaced or redone by the contractor, including all labor at no additional charge to the Town. All replacements shall carry the same guarantee as the original equipment. The contractor shall make any such replacement promptly upon receiving written notice from Town.

Section 25. Breach of Contract/Termination

25.1 If contractor fails to deliver as ordered, or within the time specified, or within reasonable time as interpreted by Town, or fails to make replacement of rejected or defective goods, whether so requested immediately or as directed by Town, that shall constitute a breach of the contract, and Town may arrange to have the work performed from other sources to take the place of the work product found defective or not delivered. Without limiting the foregoing, Town reserves the right to terminate the contract upon breach upon within ten (10) days written notice provided to the contractor.

Section 26. Prevailing Wage Rates And Supplements

26.1 Wages to be Paid and Supplements to be Provided

- i. The contractor shall, at its own cost and expense, comply with all provisions of the Labor Law (i.e. prevailing rate of wages and supplements), Lien Law, Workmen's Compensation Law and all other laws and ordinances affecting the contract or order, either Federal, State or local.

26.2 Records to be kept on Site

The contractor, subcontractors at any tier shall certify their payrolls and keep them on site and available, in addition to the following informative records:

- i. Record of hours worked by each workman, laborer and mechanic on each day;
- ii. Record of days worked each week by each workman, laborer and mechanic;
- iii. Schedule of occupation or occupations at which each workman, laborer and mechanic on the project is employed during each work day and week;
- iv. Schedule of hourly wage rates paid to each workman, laborer and mechanic for each occupation.
- v. A statement or declaration signed by each workman, laborer and mechanic attesting that they have been provided with a written notice, informing them of the prevailing wage rates and supplements requirement for the contract.

Section 27. Estimates and Payments

- 27.1 As the work progresses but not more often than once a month and then on such days as the Town shall direct, the contractor will submit a requisition in writing of the amount and value of the work performed and the materials and equipment provided to the date of the requisition, less any amount previously paid to the contractor.
- 27.2 From each requisition, the Town will retain five percent (5%) plus one hundred fifty percent (150%) of the amount necessary to satisfy any claims, liens or judgments against the contractor that have not been suitably discharged. The Town will thereupon cause the balance of the requisition therein to be paid to the contractor.
- 27.3 As a condition to the making of any progress payment as set forth in this paragraph, the Town, in its sole discretion may require the contractor to submit such document as may be reasonably required to establish that the contractor and its subcontractors have timely and properly paid their respective subcontractors and materialmen at any tier.
- 27.4 When the work or major portion thereof, as contemplated by the terms of the contract are substantially completed in the judgment of the Town, the contractor shall submit a requisition for the remainder of the contract balance. An amount equal to two (2) times the value of the remaining items to be completed plus one hundred fifty percent (150%) of the amount that the Town deems necessary to satisfy to satisfy any claims, liens or judgments against the contractor which have

not been suitably discharged shall be deducted from the requisition. As the remaining items of work are satisfactorily completed or corrected, the Town will, upon receipt of a requisition, pay for these items less one hundred fifty percent (150%) of the amount necessary to satisfy any claims, liens or judgments.

- 27.5** All estimates will be made for actual quantities for work performed and materials and equipment incorporated in the work as determined by the measurements of the Town, and this determination shall be accepted as final, conclusive and binding upon the contractor. All estimates will be subject to correction in any succeeding estimate.
- 27.6** Payment will be made only upon the written request of the contractor. Payment requests shall be processed by the Town no more than one (1) time per month. Payment will be made for materials pertinent to the project which have been delivered to the site or off-site by the contractor suitably stored and secured in first-class condition as required by the Town. The contractor must submit certified copies of the manufacturer's or vendor's invoices or statements establishing the true purchase value of the material or equipment; freight bills, release of liens and certificate of insurance covering all equipment and materials.
- 27.7** The Contractor shall be responsible for safeguarding stored equipment and materials against loss or damage of any nature whatsoever, shall retain title until incorporated into the work and acceptance by the Town and in case of loss or damage, the contractor shall replace such lost or damaged equipment and materials at no cost to the Town. After receipt of payment, the contractor shall not remove from the site equipment and materials for which such payment was made without written authorization from the Town.
- 27.8** Within thirty (30) days after receiving written notice from the Contractor of substantial completion of the work under this Agreement, the Town will cause an inspection to be made of the work done under the contract. If, upon such inspection, the Town determines that the work is substantially complete, a Substantial Completion Payment to the contractor for the work done under the contract, less any and all deductions authorized to be made by the Town under the contract or by law, will be issued.
- 27.9** As a condition precedent to receiving payment therefore, the Contractor must have received Town approval of all Shop Drawing submittals, the Operation and Maintenance Manuals, and As-Built Drawing(s).
- 27.10** Together with its application for substantial completion payment the Contractor shall also deliver to the Town a verified statement certifying that all claims or liabilities arising from the completed work, including all charges for Extra Work, Change Orders, additional time, damages or credits (collectively referred to as "claims") have been presented to the Town. All such claims shall be described in sufficient detail so as to be easily identified. The contractor's failure to submit the verified statement shall constitute a full and final waiver of all claims against the Town from the beginning of the project through the date of substantial completion

as established by the Town. The presentation of the verified statement to the Town shall not constitute an acknowledgement by the Town that any such claim is valid. The Town expressly reserves its right to assert that any such claim(s) is waived or precluded by reason of other provisions of the contract documents. Only claims particularly identified on the contractor's verified statement shall be preserved; all other claims whatever nature shall be deemed waived and released. It shall also submit proof of title of the materials and equipment covered by the contract. The contractor shall also, prior to the issuance of said Substantial Completion Payment, supply to the Town affidavits and certificates for labor, material and equipment (where applicable).

- 27.11** Within ten (10) days after receiving written notice from the contractor of completion of all the work, the Town will make a final inspection. If upon inspection the Town determines that no further work is needed, the Town will request that the Town approve the completion of the project and authorize payment of the Final Estimate.

Section 28. Payments To Subcontractors And Materialmen By Contractor

- 28.1** Within fifteen (15) calendar days of the receipt of any payment from the Town, the contractor shall pay each of its subcontractors and materialmen the proceeds from the payment representing the value of the work performed and/or materials furnished by the subcontractor and/or materialmen as reflected in the payment from the Town less an amount necessary to satisfy any claims, liens or judgment against the subcontractor or materialman which have not been suitably discharged and less any retained amount as hereafter described.
- 28.2** Nothing provided herein shall create any obligation on the part of the Town to pay or to see the payment of any moneys to any subcontractor or materialman from any contractor nor shall anything provided herein serve to create any relationship in contract or otherwise, implied or expressed between the subcontractor or materialman and the Town. Notwithstanding anything to the foregoing, the Town may tender payments to the Contractor in the form of joint or dual payee checks.

Section 29. Change in the Contract Price

- 29.1** The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to the contractor for performing the work pursuant to the contract. All duties, responsibilities and obligations assigned to or undertaken by the contractor shall be at its expense without change in the Contract Price.
- 29.2** The Contract Price may only be changed by a Change Order. Any claim for an increase in the Contract Price shall be based on written notice delivered to Town within fifteen (15) days of the occurrence of the event giving rise to the claim. Notice of the amount of the claim with supporting data shall be delivered within twenty (20) days of such occurrence unless the Town allows an additional period of time to ascertain accurate cost data. Any change in the Contract Price resulting from any such claim shall be incorporated in a Change Order. All change orders are subject to the determination and approval of the Town Board.

Section 30. Proper Method of Work And Proper Materials

- 30.1** The Town shall have the power in general to direct the order and sequence of the work, which will be such as to permit the entire work under the contract to be begun and to proceed as rapidly as possible, and such as to bring the several parts of the work to a successful completion at about the same time.
- 30.2** If at any time before the commencement or during the progress of the work the materials and appliances used or to be used appear to the Town as insufficient or improper for securing the quality of work required, or the required rate of progress, he may order the contractor to increase its efficiency or to improve their character, and the contractor shall promptly conform to such order; but the failure of the Town to demand any increase of such efficiency or improvement shall not release the Contractor from its obligation to secure the quality of work or the rate of progress specified.\
- 30.3** The Contractor will establish the lines, grades and measurements necessary in his opinion to properly locate the work, by setting suitably marked offset or reference stakes. These stakes are referenced to the control points, coordinates and similar data that may be shown on the contract drawings, but the Town reserves the right to modify that information.
- 30.4** The Contractor shall carefully and properly preserve all stakes, pins and markers required at no additional costs to the Town. All existing property lines and survey monuments which may, of necessity have to be disturbed during the construction work, will be property tied to fixed points and reset by the Contractor at no cost to the Town.

Section 31. Utilities and Service Lines

- 31.1** The Contractor is hereby warned that a reasonable opportunity is to be given the municipalities and public service corporations to alter and install pipes, conduits or other structures prior to placing to pavement. No guarantee is given that public utility structures and service lines herein shown are correctly located. Locations given are from the best available information.

Section 32. Protection, Existing Structures

- 32.1** The Contractor, at his expense, shall protect adjacent and other property or premises from damage of any kind during the progress of the work and shall erect and maintain guards around his work in such a way as to afford protection to the public. The Contractor shall be held responsible for improper, illegal, or negligent conduct of himself, his subcontractors, employees and agents in and about said work or in the execution of the work covered by this Contract.
- 32.2** The Contractor shall, at his expense, sustain in their places and permanently protect from direct or indirect injury any and all pipelines, subways, pavements, sidewalks, curbs, railways, buildings, trees, poles, wells, and other property in the vicinity of his work, whether over-or underground, or which appear within the trench or

excavations, and he shall assume all costs and expenses for direct or indirect damage which may be occasioned by injury to any of them.

- 32.3** The Contractor's liability shall also include the damage or injury sustained by any structure whatsoever due to settlement of trenches or excavations or to settlement or lateral movement of the sides of such trenches or excavations, whether such movement occurs during or after excavation or backfilling of such trenches or excavations. His liability to so support and protect all such structures from damage or injury shall continue without limitation, throughout the Contract period and during the period of guarantee.
- 32.4** The Contractor shall at all times have on the ground suitable and sufficient material and shall use the same as may be necessary or required for sustaining and supporting any and all such structures which are uncovered, undermined, weakened, endangered, threatened, or otherwise materially affected.
- 32.5** In case injury occurs to any portion of a pipeline or structure, or to the material surrounding or supporting the same, through blasting or similar operations, the Contractor shall immediately notify the Engineer, and, at his expense, shall remove such injured work and shall rebuild the pipeline or structure and shall replace the material surrounding the supporting the same, or shall furnish such material and perform such work of repairs or replacement as the Town may order. Any damage whatsoever shall be promptly, completely and satisfactorily repaired by the Contractor at his expense.

Section 33. Acceleration of the Work

- 33.1** The Town may, at its sole discretion and as circumstances reasonably require, require the contractor to accelerate the schedule of performance by providing overtime, extended day, extra crews, Saturday, Sunday and/or holiday work and/or by having all or any subcontractors designated by the Town provide overtime, extended day, extra crews, Saturday, Sunday or holiday work by the contractor's or his subcontractor's own forces.
- 33.2** The Town, pursuant to a validly issued written change order, may reimburse the contractor for the direct cost to the contractor of the premium time for the labor utilized by the contractor in such overtime, extended day, extra crews, Saturday, Sunday or holiday work (but not for the straight time costs of such labor) together with any social security and state or federal unemployment insurance taxes in connection with such premium time. However, no overhead, supervision costs, commissions, profit or other costs and expenses of any nature whatsoever, including impact costs or costs associated with lost efficiency or productivity, shall be payable in connection therewith.
- 33.3** Anything to the foregoing notwithstanding, in the event that the contractor has fallen behind schedule or in the Town's judgment appears likely to fall behind schedule, Town shall have the absolute right to direct the contractor to accelerate the performance of its work, including that of its subcontractors, and the full costs for such acceleration shall be borne solely by the contractor.

Section 34. Stopping Work

34.1 Town May Suspend Work:

- i. The Town may, at any time and without cause, suspend the work or any portion thereof for a period of not more than ninety (90) days by notice in writing to the contractor which shall fix the date on which work shall be resumed. The contractor shall resume the Work on the date so fixed. Subject to the approval of the Town Board, the contractor may be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension.

34.2 The Town May Terminate:

A. Upon the occurrence of any one or more of the following events:

1. If the contractor is adjudged bankrupt or insolvent,
2. If the contractor makes a general assignment for the benefit of creditors,
3. If a trustee or receiver is appointed for the contractor or for any of the contractor 's property,
4. If the contractor files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or similar laws,
5. If the contractor repeatedly fails to supply sufficient skilled workers or suitable materials or equipment,
6. If the contractor repeatedly fails to make prompt payments to Subcontractors or for labor, materials or equipment,
7. If the contractor disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction,
8. If the contractor disregards the authority of the Town, or
9. If the contractor otherwise violates in any substantial way any provisions of the Bid Documents or the Contract. The Town may after giving the contractor and its Surety seven (7) days written notice, terminate the services of the contractor, exclude the contractor from the site, incorporate in the Work all materials and equipment stored at the site or for which Town has paid the contractor but which are stored elsewhere, and finish the Work as Town may deem expedient. In such case the contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the Contract Price exceeds the direct and indirect costs of completing the work, including compensation for additional professional services, such excess shall be paid to the contractor. If such costs exceed such unpaid balance, the contractor shall pay the difference to the Town.

- B. Where the contractor's services have been so terminated by the Town, the termination shall not affect any rights of Town against the contractor then existing or which may thereafter accrue. Any retention or payment of moneys due the contractor by Town will not release the contractor from liability.

- C. Upon seven (7) days written notice to the contractor, Town may, without cause and without prejudice to any other right or remedy, elect to abandon the work and terminate the Agreement. In such case, the contractor shall be paid (without duplication of any items):
 - 1. For completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date or termination, including fair and reasonable sum of overhead and profit on such work;
 - 2. For expenses sustained prior to effective date of termination in performing services and furnishing labor, materials or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
 - 3. For amounts paid in settlement of terminated contracts with Subcontractors, manufacturers, fabricators, suppliers or distributors and others; and
 - 4. For reasonable expenses directly attributable to termination. contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss or any consequential damages arising out of such termination.

Section 35. Change in the Contract Time

- 35.1** The contractor agrees that it will make no claim against the Town or any of its representatives for damages for delay, interference or disruption in the performance of its Contract occasioned by any act or omission to act by the Town or any of its representatives, or occasioned by any act or omission of any other contractor and further agrees that any such claim shall be fully compensated for by an extension of time to complete the performance of the work as provided herein.

- 35.2** The Contract Time may only be changed by a Change Order. Any claim for an extension in the Contract Time shall be based on written notice delivered to Town within fifteen (15) days of the occurrence of the event giving rise to the claim. Notice of the extent of the claim with supporting data shall be delivered within twenty (20) days of such occurrence unless the Town allows an additional period of time to ascertain more accurate data. Any change in the Contract Time resulting from any such claim shall be incorporated in a Change Order.

- 35.3** The Contract Time will be extended in an amount equal to time lost due to delays beyond the control of the contractor. Such delays shall include, but not be limited

to, acts or neglect by Town, or to fires, floods, labor disputes, epidemics, abnormal weather conditions, or acts of God. No extension of the Contract Time will be granted where the delay is attributable to a subcontractor, manufacturer, fabricator, supplier or distributor or any other party performing services or furnishing material or equipment on behalf of the contractor unless such party's delay is attributable to one of the above enumerated causes.

35.4 The time limits concerning Substantial Completion and final completion as stated in the Contract Documents are of the essence. The provisions of this section shall not exclude recovery for damages (including compensation for additional professional services) for delay by either party, provided, however that the contractor shall not be entitled to damages for any delay occurring as a consequence of a delay if the performance of said additional work was noted in the Contract Documents and the delay (by others) was not directly caused by the fault of the Town.

Section 36 Disputed Work - Notice of Claims For Damages

36.1 If the contractor is of the opinion that any work required, necessitated, or ordered violates or conflicts with or is not required by the terms and provisions of the contract, he must promptly, within five (5) calendar days after being directed to perform such work, notify the Town, in writing, of its contentions with respect thereto and request a final determination thereon. If the Town determines that the work in question is contract and not extra work, or that the order complained of is proper, he will direct the Contractor in writing to proceed and the Contractor shall promptly comply. In order, however, to preserve its right to claim compensation for such work or damages resulting from such compliance, the Contractor must, within seven (7) calendar days after receiving notice of the Town's determination and direction, notify the Town, in writing that the work is being performed or that the determination and direction is being complied with, under protest. Failure of the Contractor to so notify shall be deemed as a waiver of claim for extra compensation or damages therefore.

36.2 The contractor is bound by the provisions of all applicable laws, including but not limited to the General Municipal Law and the Town Law, as related to the presentation of claims.

36.3 While the contractor is performing disputed work or complying with a determination or order under protest in accordance with this Article, in each such case the contractor shall furnish the Town daily with three copies of written statements signed by the Contractor's representatives at the site showing:

- i.** the name of each workman employed on such work or engaged in complying with such determination or order, the number of hours employed thereon, and the character of the work each is doing; and

- ii. the nature and quantity of any materials, plant and equipment furnished or used in connection with the performance of such work or compliance with such order, and from whom purchased or rented.

36.4 The contractor shall carry on the work and maintain the progress schedule during all disputes or disagreements with the Town. No work shall be delayed or postponed pending resolution of any disputes or disagreements, except as the contractor and Town may otherwise agree in writing.

36.5 Before final acceptance of the work by the Town, all matters of dispute must be adjusted to the mutual satisfaction of the parties thereto. Determinations and decisions in case any question shall arise, shall constitute a condition precedent to the right of the Contractor to receive the money therefore, until the matter in question has been adjusted.

PART THREE

GENERAL SPECIFICATIONS

010100	Site Preparation and Removals
015526	Maintenance and Protection of Traffic
017421	Construction/Demolition Waste Disposal
022200	Earthwork
022300	Crushed Stone and Gravel
027800	Detectable Warning Pavers
032000	Concrete Reinforcement
033000	Cast in Place Concrete
061053	Miscellaneous Rough Carpentry
061100	Fiberglass Columns
073126	Slate Shingles
076200	Sheet Metal Flashing and Trim
265600	Exterior Lighting
321216	New Asphalt Pavement

NON-COLLUSIVE BIDDING CERTIFICATION

This Non-Collusive Bidding Certificate is made pursuant to Section 103-d of the General Municipal Law of the State of New York.

By submission of this bid, Bidder and each person signing on behalf of Bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of his or her knowledge and belief:

The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement for the purpose of restricting competition, as to any matter relating to such prices with any other Bidder or with any competitor;

Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by Bidder and will not knowingly be disclosed by Bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and

No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

A bid shall not be considered for award nor shall any award be made where (1) (2) and (3) above, have not been complied with; provided, however, that if in any case Bidder cannot make the foregoing certification, Bidder shall so state and shall furnish with the bid a signed statement which sets forth in detail the reasons therefore. Where (1) (2) and (3) above have not been complied with, the bid shall not be considered for award nor shall any award be made unless the head of the purchasing unit of the political subdivision, public department, agency or official thereof to which the bid is made, or his designee, determines that such disclosure was not made for the purpose of restricting competition.

Dated: _____

Bidder: _____
(Legal name of person, firm or corporation)

By: _____
(Signature)

(Please Print Name)

(Title)

State of New York)
Town of _____)ss.:

On the ____ day of _____ in the year 2022 before me, the undersigned, personally appeared _____, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

(Notary Public)

SECTION 010100 SITE PREPARATION AND REMOVALS

PART 1: WORK

1.01 DESCRIPTION

Under this work, the Contractor shall furnish all labor, materials and equipment necessary to perform clearing, grubbing and removals within the proposed construction area as required to complete the proposed improvements. This shall include such work as removing shrubbery, trees, roots, stumps, stones, vines, topsoil, organic matter, masonry, large boulders, concrete pavement and curbs, concrete rubble, asphalt, existing utilities to be removed, rubbish and other objectionable materials. The Engineer, at his discretion, may require additional work under this section if he deems this work necessary to comply with the intent of this project. Any work not included under this specification but required for the successful completion of project work, as deemed by the Engineer, shall be performed by the Contractor as directed by the Engineer and paid for under Item 0905 Miscellaneous Additional Work.

The Contractor shall carefully protect all trees and shrubs and other growth shown on the plan to be protected to remain per specification "RESTORATION." The Engineer shall have the final authority on the removal of all trees and existing features to remain. The Contractor at his expense in accordance with Specification "RESTORATION" and the General Conditions shall replace any trees removed contrary to the orders of the Engineer. The Contractor shall be responsible for any and all damages to property caused by the removals operations. All damaged trees and plants or improvements shall be replaced or restored to their original condition to the satisfaction of the Engineer. Further any new or existing improvements to remain shall also be protected throughout the construction of the project. The Contractor will be responsible at his expense to replace any improvements damaged by his company workers and those of any sub-contractors under the Contractor.

All materials removed under this item, which are not to be reset, shall be promptly and legally disposed of offsite by the Contractor. Burning material shall not be allowed. No removed trees, shrubs, stumps, roots, wood chips or branches may be used as backfill.

PART 2: MATERIALS

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PART 3: METHOD

3.01 DESCRIPTION

Unless otherwise directed, the Contractor shall thoroughly clear, grub and remove all objectionable surface material flush with existing grades. Trees, stumps, roots and shrubs will be removed to a depth of two feet below subgrade or as required to provide a suitable subgrade upon which the proposed facilities shall be constructed.

Note that existing topsoil shall be stored on site and protected during the course of construction.

All debris, refuse, solid waste, tires, wooden planks, junk of any nature, etc. shall also be removed from the site and disposed of legally in a manner that meets all applicable Federal, State and local codes and ordinances.

3.02 CLEARING AND REMOVALS

From areas to be cleared, the Contractor shall cut or otherwise remove all sapling trees, brush, and other vegetable matter such as snags, bark, shrubbery, trees, roots, stumps, stones, vines, topsoil, organic matter, masonry, large boulders, concrete pavement and curbs, concrete rubble, asphalt, existing utilities to be removed, rubbish and other objectionable materials. No debris may be disposed of on premises.

3.03 GRUBBING

The site has been previously cleared of all trees, tree stumps. Grubbing is not required under this contract.

3.04 STRIPPING

All stumps, roots, foreign matter, topsoil, loam and unsuitable earth shall be stripped from the ground surface. The topsoil and loam shall be utilized insofar as possible, for finished surfacing unless otherwise directed by the Engineer. Only excess or unsuitable soils shall be taken from the site unless otherwise directed by the Engineer.

Strip topsoil to depths encountered in a manner that prevents intermingling of topsoil with underlying subsoil or other objectionable material.

The Contractor shall not strip topsoil from within the drip line of any tree to remain.

3.05 STOCKPILING

The Contractor shall stockpile topsoil in storage piles where approved by the Engineer and construct stockpiles so that surface water drains freely.

3.06 DISPOSAL

The Contractor shall protect topsoil piles if required by the work. Silt fencing around the perimeter shall be installed to prevent soil erosion and sedimentation. All material resulting not scheduled for reuse or stockpiling shall become the property of the Contractor and shall be suitably disposed of off site in accordance with all applicable laws, ordinances, rules and regulations, unless otherwise directed by the Engineer.

All removed trees, shrubs, stumps, roots, wood chips or branches, concrete debris, asphalt debris, remains of utilities or other structures, or any debris remaining from site preparation or excavation must be disposed of off-site. No woody debris must be used as fill or backfill or embankments or dikes.

Such disposal shall be performed as promptly as possible after removal of the material and shall not be left until the final period of cleaning up. It is the Contractors responsibility to properly dispose of any materials to be removed off-site as per all sections of these specifications. The Contractor is responsible to find a legitimate disposal site and must obtain any permits or licenses required for proper disposal. The Contractor is responsible for any fees or fines associated with the proper disposal of any materials outline in all sections of these specifications.

PART 4: MEASUREMENT AND PAYMENT

4.01 DESCRIPTION

The cost for this work item shall be on a lump sum basis and shall include the cost of all labor, materials and equipment necessary to clear grub and remove all objectionable material within the limits shown on the Contract Drawings and as directed by the Engineer.

The work shall include but not be limited to clearing surface material, removal and disposal of shrubbery, trees, stones, vines, topsoil, organic matter, masonry, large boulders, concrete rubble, concrete pavement and curbs, concrete rubble, asphalt, existing utilities to be removed, rubbish and other objectionable materials as determined and directed by the Engineer.

SECTION 015526

**MAINTENANCE AND PROTECTION OF TRAFFIC
(WORK ZONE TRAFFIC CONTROL)**

PART 1: WORK

1.01 DESCRIPTION

Under this item the Contractor shall furnish all labor, materials and equipment required to protect and maintain pedestrian and vehicular traffic. The work shall include providing flagmen, lighted barricades, steel plating and proper temporary traffic signage during construction as specified hereinafter and as directed by the Engineer.

1.02 REFERENCES

- A. "National Manual of Uniform Traffic Control Devices," New York State Department of Transportation Supplement;" (MUTCD);
- B. New York State Department of Transportation Internet Site "Work Zone Traffic Control Manual" (WZTCM);

PART 2: MATERIALS

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PART 3: METHOD

3.01 DESCRIPTION

The Contractor shall maintain and protect traffic by so conducting his construction operations that the traveling public is subjected to a minimum of delay and hazard in accordance with the references listed in 1.02.

Residents along the existing roads and those having business along them shall have safe means of ingress and egress at all times. Traffic shall be maintained at the intersections of all roads or streets crossing the road construction. Where directed by the Engineer, the Contractor shall provide such adequate and proper bridges over excavations as may be necessary or directed for the purpose of accommodating pedestrians or vehicles. In the event any portion of a public road must be closed to traffic, permission shall be secured by the Contractor from the Engineer and Highway Department and written notice must be given by the Contractor to the Police and Fire Departments, and adequate detour signs posted. The Contractor must notify in writing, any other public services affected by the road closing.

Approved traffic control devices in accordance with the references listed in 1.02 shall be provided along all highways while work is in progress. Where traffic direction is required, flagmen shall be designated by the Contractor to direct traffic past the construction equipment, machinery or construction operations. Construction equipment shall be removed entirely from the traveled roadway when work is shut down for the day and two lanes of traffic shall be maintained at night. Barricades shall be placed wherever the safety of the traveling public requires, where a road is officially closed, where an excavation is being made, or where heavy construction equipment is operating. In addition, barricades shall be placed where they are deemed necessary, in the opinion of the Engineer, Highway Superintendent or the Chief of Police, to direct traffic or to prevent entrance to streets or areas where construction is in progress.

The work shall include but not be limited to furnishing and installing steel plating excavations, securing the plates, installing a bituminous wedge around the plates, maintenance, removal of plates and any other incidentals to complete the work as directed by the Engineer. Where trenches have been cut, barricades, red flags, and warning signs, all properly lighted, shall be placed at frequent intervals and maintained until the trenches have been properly backfilled and compacted. All barricades, lights, and flags shall be maintained intact at all times overnight, over the weekends, holidays, or if the project is shut down for any period of time. This maintenance shall be included as part of the bid price for the item requiring maintenance and protection of traffic.

The contractor shall coordinate with the Town Engineer to insure safe access to Town Hall is provided throughout construction.

PART 4: MEASUREMENT AND PAYMENT

4.01 DESCRIPTION

The cost for this work item shall be paid as a lump sum item and shall include the cost of all labor, materials and equipment necessary to perform this work and any incidental work required to complete the work as specified in the Contract Documents and Specifications, and to the satisfaction of the Engineer. No additional payment will be made for this item as this work is incidental to the performance of this Contract.

END OF SECTION

PART 1 **GENERAL**

1.1 **SECTION INCLUDES**

- .1 Text, schedules, and procedures for systematic Waste Management Program for construction, deconstruction, demolition, and renovation projects.

1.2 **DEFINITIONS**

- .1 Demolition Waste Audit (DWA): Relates to actual waste generated from project.
- .2 Materials Source Separation Program (MSSP): Consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.
- .3 Recyclable: Ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse by others.
- .4 Recycle: Process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .5 Recycling: Process of sorting, cleansing, treating, and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .6 Reuse: Repeated use of product in same form but not necessarily for same purpose. Reuse includes:
 - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
 - .2 Returning reusable items including pallets or unused products to vendors.
- .7 Salvage: Removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .8 Separate Condition: Refers to waste sorted into individual types.
- .9 Source Separation: Acts of keeping different types of waste materials separate beginning from first time they became waste.

1.3 STORAGE, HANDLING AND PROTECTION

- .1 Unless specified otherwise, materials for removal become Contractor's property.
- .2 Protect, stockpile, store, and catalog salvaged items.
- .3 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to approved local facility.
- .4 Protect structural components not removed for demolition from movement or damage.
- .5 Support affected structures. If safety of building is endangered, cease operations and immediately notify Department having jurisdiction.
- .6 Protect surface drainage, mechanical and electrical from damage and blockage.
- .7 Separate and store materials produced during dismantling of structures in designated areas.
- .8 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.

1.4 DISPOSAL OF WASTES

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of any waste into waterways, storm, or sanitary sewers.
- .3 Remove materials from deconstruction as deconstruction/disassembly Work progresses.
- .4 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.

1.5 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises.
- .2 Provide security measures approved by Owner.

1.6 SCHEDULING

- .1 Coordinate Work with other activities at site to ensure timely and orderly progress of Work.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 APPLICATION

- .1 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

- .1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
- .2 Clean-up work area as work progresses.
- .3 Source separate materials to be reused/recycled into specified sort areas.

3.3 DIVERSION OF MATERIALS

- .1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Owner and consistent with applicable fire regulations.
 - .1 Mark containers or stockpile areas.
 - .2 Provide instruction on disposal practices.
- .2 On-site sale or distribution of salvaged materials to third parties is not permitted.

END OF SECTION

SECTION 022200- EARTHWORK
PART 1 GENERAL

1.01 DEFINITIONS

- A. The following terms have the meanings ascribed to them in this Article, wherever they appear in this Section.
1. Earth Excavation: The removal of all surface and subsurface material not classified as rock as defined below.
 2. Rock: Limestone, sandstone, shale, granite, and similar material in solid beds or masses in its original or stratified position which can be removed only by blasting operations, drilling, wedging, or use of pneumatic tools, and boulders with a volume greater than 1.0 cu yd.
 - a. Limestone, sandstone, shale, granite, and similar material in a broken or weathered condition which can be removed with an excavator or backhoe equipped with a bucket with ripping teeth or any other style bucket shall be classified as earth excavation.
 - b. Masonry building foundations, whether indicated or not, shall be classified as earth excavation.
 3. Unclassified Earth Excavation: The excavation and disposal of all surface and subsurface materials of any description necessary to perform the work of this contract. This will include:
 - a. All soil deposits of any description both above and below groundwater levels. These may be naturally deposited or placed by previous construction operations.
 - b. Ledge rock of all quality. (Limestone, Sandstone, Shale, Granite and similar materials in solid beds or masses in its original or stratified position which can only be removed by drilling, wedging, use of pneumatic tools or heavy ripping equipment.)
 - c. Boulders of any size.
 - d. Any materials of man-made origin.
 4. Subgrade Surface: Surface upon which subbase or topsoil is placed.
 5. Subbase: Select granular material or subbase course Type 2 which is placed immediately beneath pavement or concrete slabs.
 6. Foundation Bearing Grade: Grade/elevation at which the bottom-
 7. Maximum Density: The dry unit weight in pounds per cubic foot of the soil at "Optimum Moisture Content" when determined by ASTM D 698 (Standard Proctor), or ASTM D 1557 (Modified Proctor).
 8. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
 9. Landscaped Areas: Areas not covered by structures, walks, roads, paving, or parking.

10. Unauthorized Excavation: The removal of material below required elevation indicated on the Drawings or beyond lateral dimensions indicated or specified without specific written direction by the Engineer.
11. Grading Limit Line (Shown on Drawings): Limits of grading, excavations and filling required for the work of this contract. Unless specifically noted otherwise, the Grading Limit Line and Contract Limit Line will be considered the same.

1.02 SUBMITTALS

- A. Shop Drawings:
 1. Sheeting, Shoring, and Bracing (Shown on the Drawings): Submit shop drawings for sheeting, shoring, and bracing shown on the Drawings. Shop drawings will be signed by a New York State licensed Professional Engineer.
- B. Product Data:
 - 1.. Filter Fabric: Manufacturer's catalog sheets, specifications, and installation instructions.
- C. Samples: Submit samples as follows. Take the samples in the presence of the Engineer and submit to the Engineer the laboratory test results for gradation, proctors, and soundness tests, when required. These tests will be performed in accordance with ASTM standards, will be performed and signed by a certified soils laboratory, and will be submitted as part of the original submittal. At a minimum the samples taken will be of the following quantities:
 1. Select Granular Material: 50 - 60 lb. (Two Samples).
 2. Subbase Course Type 2: 50 - 60 lb. (Two Samples).
 3. Selected Fill: 40 - 50 lb.
 4. Cushion Material: 30 lb.
 5. Item B-12: 30lb, each gradation.
 6. Crushed Stone: 30 lb.
 7. Underdrain Filter Material: 40 - 50 lb.
 8. Crushed Stone, Crushed Gravel, or Screened Gravel (Wastewater): 30 lb., each layer gradation (if more than one).
- D. Quality Control Submittals:
 1. Subbase Materials: Name and location of source and the DOT Source Number. If the material is not being taken from an approved DOT Source the results of the gradation and soundness tests performed by an ASTM certified soils laboratory will be required.
 2. Other Aggregates: Name and location of source and soil laboratory test results.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Subbase Course (NYSDOT Type 4): Recycled materials will not be accepted.
- B. Selected Fill: Sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with the gradation requirements specified below:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
4 inch	101.6	100
No. 40	0.425	0-70
No. 200	0.075	0-15

- C. Suitable Material (Fill and Backfill for Landscaped Areas): Material consisting of mineral soil (inorganic), blasted or broken rock and similar materials of natural or man-made origin, including mixtures thereof. Maximum particle size will not exceed 2/3 of the specified layer thickness prior to compaction. NOTE: Material containing cinders, industrial waste, sludge, building rubble, land fill, muck, and peat will be considered unsuitable for fill and backfill, except topsoil and organic silt may be used as suitable material in landscaped areas provided it is placed in the top layer of the subgrade surface.
- D. Flowable Fill (Kcrete): Shall consist of a mixture of Portland cement, sand, water, and admixtures proportioned to provide a non-segregating, free-flowing, self-consolidating material that will result in a hardened, dense backfill.
 - 1. Shall have a 28-day compressive strength between 40 and 100 psi.

2.02 GEOTECHNICAL FABRICS

- A. Filter Fabric (GeoTextile):
 - 1. Drainage and Erosion Control: Amoco 1199 & 2019, Maccaferri MacTex MX140 & MX155, Mirafi 140N & 160N, Fiberweave 403 & 404 or equivalent.
 - 2. Separation for foundation drains, underdrains, undercuts: Amoco 2002 & 2004, Contech Construction Products Inc. C-180, Synthetic Industries Geotex 250ST & 315ST, Mirafi Geolon HP570 & HP1500 or equivalent.
 - 3. Separation/Stabilization beneath pavements: GeoTex 801, Bonded Fibers Products PN080, Maccaferri Gabions MacTex MX275 & 340, Mirafi 160N & 180N or equivalent.

PART 3 EXECUTION

3.01 CLEARING AND GRUBBING

- A. Clear and grub the Site within the Grading Limit Line (GLL) of trees, shrubs, brush, other prominent vegetation, debris, and obstructions except for those items indicated to remain. Completely remove stumps and roots protruding through the ground surface.
 - 1. Use only hand methods for grubbing inside the drip line of trees indicated to be left standing.
 - 2. Where roots and branches of trees indicated to be saved interfere with new construction, carefully and cleanly cut them back to point of branching.
- B. Fill depressions caused by the clearing and grubbing operations in accordance with the requirements for filling and backfilling unless further excavation is indicated.

3.02 REMOVAL OF TOPSOIL

- A. Remove existing topsoil from areas within the Grading Limit Line where excavation or fill is required.
- B. Stockpile approved topsoil where directed until required for use. Place, grade, and shape stockpiles for proper drainage.
 - 1. Topsoil will be tested prior to stockpiling. Stockpile only quantities of topsoil approved in writing for re-use.

3.03 UNDERGROUND UTILITIES

- A. Locate existing underground utilities prior to commencing excavation work. Determine exact utility locations by hand excavated test pits. Support and protect utilities to remain in place.
- B. Do not interrupt existing utilities that are in service until temporary or new utilities are installed and operational.
- C. Utilities to remain in service: Will be re-routed as shown on the Contract Drawings.
- D. Utilities abandoned beneath and five feet laterally beyond the structure's proposed footprint will be removed in their entirety. Excavations required for their removal will be backfilled and compacted as specified herein.
- E. Utilities extending outside the five feet limit specified above may be abandoned in place provided their ends are adequately plugged as described below.
 - 1. Permanently close open ends of abandoned underground utilities exposed by excavations, which extend outside the limits of the area to be excavated.
 - 2. Close open ends of metallic conduit and pipe with threaded galvanized metal caps or plastic plugs or other approved method for the type of material and size of pipe. Do not use wood plugs.
 - 3. Close open ends of concrete and masonry utilities with concrete or flow-able fill.

3.04 EXCAVATION

- A. Excavate earth as required for the Work.
- B. Install and maintain all erosion and sedimentation controls during all earthwork operations as specified on the Contract Drawings or as directed by local officials. If the erosion and sedimentation controls specified by the local officials are more stringent than those specified on the Contract Drawings contact the Engineer.
- C. Maintain sides and slopes of excavations in a safe condition until completion of backfilling. Comply with Code of Federal Regulations Title 29 - Labor, Part 1926 (OSHA).
 - 1. Trenches: Deposit excavated material on one side of trench only. Trim banks of excavated material to prevent cave-ins and prevent material from falling or sliding into trench. Keep a clear footway between excavated material and trench edge. Maintain areas to allow free drainage of surface water.
- D. Stockpile excavated materials classified as suitable material where directed, until required for fill. Place, grade, and shape stockpiles for proper drainage as approved by the Engineer.
- E. Excavation for Structures: Conform to elevations, lines, and limits indicated. Excavate to a vertical tolerance of plus or minus 1 inch. Extend excavation a sufficient lateral distance to provide clearance to execute the Work.
- F. Footings and Foundations: The foundation bearing grade will be established just prior to constructing the concrete foundations when concrete is to bear on undisturbed soil.
 - 1. Stepping Footings: Cut sloping surfaces under footings, foundations, steps, and where required for other Work as indicated.
 - 2. Pile Foundations: Stop excavations 6 to 12 inches above the bottom of pile cap elevation before the piles are placed. After pile installation, remove loose and displaced material and excavate to final grade, leaving a solid base to receive concrete pile caps.
 - 3. Where footings and other Work requiring similar soil support will rest entirely on rock, remove loose soil and loose rock and place concrete to the required elevations. Where footings and other Work requiring similar soil support will rest partially on rock and partially on soil, immediately notify the Director before any backfilling or concrete placement occurs; the Director will determine the correct foundation treatment for the Work.
- G. Slabs and Floors: Excavate to the following depths below bottom of concrete for addition of select granular material:
 - 1. Interior Floors: 6 inches unless otherwise indicated.
 - 2. Exterior Slabs and Steps: 12 inches unless otherwise indicated.
- H. Pipe Trenches: Open only enough trench length to facilitate laying pipe sections. Unless otherwise indicated on the Drawings, excavate trenches approximately 24 inches wide plus the outside pipe diameter, equally divided on each side of pipe centerline. Cut trenches to cross section, elevation, profile, line, and grade indicated. Accurately grade and shape trench bottom for uniform bearing of pipe in undisturbed earth. Excavate at bell and coupling joints to allow ample room for proper pipe connections. Pavement shall be saw cut to the dimensions shown on the plans.
 - 1. Trench in Rock: Excavate an additional 6 inches below bottom of pipe for bed of cushion material under the piping.

- I. Open Ditches: Cut ditches to cross sections and grades indicated.
- J. Pavement: Excavate to subgrade surface elevation.
- K. Unauthorized Excavations: Unless otherwise directed, backfill unauthorized excavation under footings, foundation bases, and retaining walls with compacted select granular material without altering the required footing elevation. Elsewhere, backfill and compact unauthorized excavation as specified for authorized excavation of the same classification, unless otherwise directed by the Director.
 - 1. Unauthorized excavations under structural Work such as footings, foundation bases, and retaining walls will be reported immediately to the Director before any concrete or backfilling Work commences.
- L. Notify the Engineer upon completion of excavation operations. Do not proceed with the Work until the excavation is inspected and approved. Inspection of the excavation by the Engineer will be made on three working days notice.
- M. Removal of Unsuitable Material Beneath Structures and Other Improvements: Excavate encountered unsuitable materials, which extend below required elevations, to additional depth as directed by the Director. Have cross sections taken, under the supervision of an independent Land Surveyor, to determine the quantity of such excavation. Do not backfill this excavation prior to quantity measurement.
 - 1. Such additional excavation and backfilling, not due to error, fault or neglect of the Contractor and exceeding the numeric quantities indicated on the Drawings, will be paid for at the unit prices specified in this Section.

3.05 DEWATERING

- A. Prior to the performance of any excavations provide dewatering methods such that the groundwater table is maintained at an elevation that is beneath the excavated depth.
- B. Prevent surface and subsurface water from flowing into excavations and trenches and from flooding the site and surrounding area.
- C. Do not allow water to accumulate in excavations or trenches. Remove water from all excavations immediately to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to the stability of subgrades and foundations. Furnish and maintain pumps, sumps, suction and discharge piping systems, and other system components necessary to convey the water away from the Site.
- D. Convey water removed from excavations, and rainwater, to collecting or run-off area. Cut and maintain temporary drainage ditches and provide other necessary diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.
- E. Provide temporary controls to restrict the velocity of discharged water as necessary to prevent erosion and siltation of receiving areas.

3.06 SHEETING, SHORING, AND BRACING

- A. Temporary Sheeting: Install temporary sheeting or sheet piling with shoring and bracing as required to create a safe working environment and prevent settlement or other damage to adjacent grounds and structures resulting from excavation operations. Shore and brace sheeting in a manner which will not interfere with progress of other Work or related contracts (if any) on this project. Check shoring and bracing for settlement and adjust for settlement. Promptly remove temporary sheeting, shoring, and bracing when no longer required.

3.07 PLACING FILTER FABRIC

- A. Place and overlap filter fabric in accordance with the manufacturer's installation instructions, unless otherwise shown.
- B. Cover tears and other damaged areas with additional filter fabric layer extending three feet beyond the damage.
- C. Do not permit traffic or construction equipment directly on filter fabric.
- D. Backfill over filter fabric within two weeks after placement. Backfill in accordance with the fabric manufacturer's instructions and in a manner to prevent damage to the fabric.

3.08 PLACING FILL AND BACKFILL

- A. Surface Preparation of Fill Areas: Strip topsoil, remaining vegetation, and other deleterious materials prior to placement of fill. Remove all asphalt pavement in its entirety from areas requiring the placement of fill or break up old pavements to a maximum size of four inches. Prior to placement of fill, smooth out and compact areas where wheel rutting has occurred due to stripping or earthwork operations.
- B. Excavations: Backfill as promptly as Work permits, but not until completion of the following:
 - 1. Acceptance by the Engineer of construction below finish grade including, where applicable, dampproofing, waterproofing, perimeter insulation, and bearing capacity of supporting soil.
 - 2. Inspection, testing, approval, and recording locations of underground utilities.
 - 3. Removal of concrete formwork.
 - 4. Removal of temporary sheeting or sheet piling and backfilling of voids caused by removals.
 - 5. Cutting off top of permanent sheeting or sheet piling.
 - 6. Removal of trash and debris.
 - 7. Installation of permanent or temporary bracing on horizontally supported walls.
- C. Place backfill and fill materials in layers not more than eight inches thick in loose depth unless otherwise specified. Before compaction, moisten or aerate each layer as necessary to facilitate compaction to the required density. Do not place backfill or fill material on surfaces that are muddy, frozen, or covered with ice.
 - 1. Place fill and backfill against foundation walls, and in confined areas such as trenches not easily accessible by larger compaction equipment, in maximum six-inch-thick loose depth layers.
 - 2. For large fill areas, the layer thickness may be modified by the Engineer, at the Contractor's written request, if in the Engineer's judgment, the equipment used is capable of compacting the fill material in a greater layer thickness. This request will include the type and specifications of compaction equipment intended for use.
 - 3. For Open Graded Stone/Clean Stone (Item B-12, No. 1 crushed stone, No. 2 crushed stone, etc.) in excess of six inches: Material must be wrapped in separation fabric.
- D. Concrete walls:
 - 1. Do not place fill or backfill against concrete walls until the walls have attained 70 percent of their design strength. Place backfill against walls of structures containing basements or crawl spaces only after the first-floor structural members are in place and any concrete components of the first-floor structural system have attained 70 percent of their concrete design strength.
 - 2. Prevent wedging action of backfill against structures backfilled on both sides, by placing backfill uniformly around structure so that the elevation on each side never differs by more than 24 inches.
- E. Foundation Drains:
 - 1. Line pipe trench loosely with filter fabric. Lap successive sheets 18 inches.
 - 2. Place underdrain filter material a minimum of 4 inches deep under pipe and 6 inches on both sides and over top of drain pipe.
 - 3. Completely wrap underdrain filter material with filter fabric.

4. Within two weeks complete balance of backfill with selected fill extending 2 feet out from foundation wall and up to 6 inches below finished grade.
- F. Perimeter Insulation: Before the insulation is installed, place and tamp specified backfill to a smooth plane even with the required elevation of the lower surface of the insulation.
- G. Under Exterior Concrete Slabs and Steps:
1. Up to Subgrade Surface Elevation: Place selected fill when fill or backfill is required.
 2. Subbase Material: Place 12 inches of select granular material over subgrade surface.
- H. Under Interior Concrete Slabs:
1. Up to Subgrade Surface Elevation: Place selected fill when fill or backfill is required.
 2. Subbase Material: Place six inches of select granular material over subgrade surface.
- I. Under Pavements and Walks:
1. Up to Subgrade Surface Elevation: Place selected fill when fill or backfill is required.
 2. Subbase Material: Place as indicated.
- J. Landscaped Areas: Place suitable material when required to complete fill or backfill areas up to subgrade surface elevation. Do not use material containing rocks over four inches in diameter within the top 12 inches of suitable material.
- L. Plastic Pipe in Trenches: Place cushion material a minimum of six inches deep under pipe, 12 inches on both sides, and 12 inches above top of pipe. Complete balance of backfill as specified.
1. Trench in Rock: Place a minimum six-inch-deep bed of cushion material under pipe.
- M. Copper Tubing and Steel Gas Pipe in Trenches: Place cushion material a minimum of six inches deep under pipe, 12 inches on both sides, and 12 inches above top of pipe. Complete balance of backfill as specified.
- N. Backfilling Excavation Resulting from Removal of Unsuitable Material Beneath Structures and Other Improvements: Backfill the excavation with compacted select granular material.
1. Such additional backfilling, exceeding the numeric quantities indicated on the Drawings, is included in the unit prices specified in this Section.

3.09 ADDITIONAL REQUIREMENTS FOR PLACING FILL TO SUPPORT STRUCTURES

- A. Place fill within the entire area enclosed by a line ten feet outside the perimeter of the structure to be constructed as follows:
1. Strip the area in accordance with the requirements for Surface Preparation of Fill Areas.
 2. Compact the stripped surface to 95 percent of maximum density.
 3. Place fill in horizontal layers not exceeding eight inches loose depth and compact layers as specified.
- B. Place fill within the entire area enclosed by a line 10 feet outside the perimeter of the structure to be constructed as follows:

1. Strip the area in accordance with the requirements for Surface Preparation of Fill Areas.
 2. Proof roll the stripped surface with at least five passes of a vibratory drum compactor having a minimum unsprung drum weight of seven tons. Notify the Engineer of the proposed date for beginning proof rolling at least seven working days prior to commencing proof rolling.
 3. Excavate unsuitable materials (soft and unstable earth) disclosed by the proof rolling operation and replace with compacted Selected Fill material.
 4. Place fill in horizontal layers not exceeding eight inches loose depth and compact layers as specified.
- C. Obtain written approval of fill area compaction before excavating for footing.
- D. Excavate for footing width plus one foot on each side.
- E. Excavate one foot below footing elevations where bottom of footings are two feet or less above or four feet or less below original ground surface.
1. Compact footing bottom and place a one-foot bed of select granular material. Compact select granular material in six-inch layers.
 2. Omit excavation and select granular material below bottom of footings where footing elevations are more than two feet above or more than 4 feet below original ground surface.

3.10 COMPACTION

- A. All materials with exception of open graded stone (No. 2 Coarse aggregate, No. 1 Coarse aggregate, Item B-12, etc.):
1. Compact each layer of fill and backfill for the following area classifications to the percentage of maximum density specified below and at a moisture content suitable to obtain the required densities, but at not less than three percent drier or more than two percent wetter than the optimum content as determined by ASTM D 698 (Standard Proctor) or 1557 (Modified Proctor).
 - a. Structures (entire area within ten feet outside perimeter): 95 percent.
 - b. Concrete Slabs and Steps: 95 percent.
 - c. Landscaped Areas: 90 percent.
 - d. Pavements and Walks: 95 percent.
 - e. Pipes and Tunnels: 95 percent.
 - f. Pipe Bedding: 95 percent.
 2. When the existing ground surface to be compacted has a density less than that specified for the particular area classification, break up and pulverize, and moisture condition to facilitate compaction to the required percentage of maximum density.
 3. Moisture Control:
 - a. Where fill or backfill must be moisture conditioned before compaction, uniformly apply water to the surface and to each layer of fill or backfill. Prevent ponding or other free water on surface subsequent to, and during compaction operations.
 - b. Remove and replace, or scarify and air dry, soil that is too wet to permit compaction to specified density. Soil that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing, until moisture content is reduced to a value which will permit compaction to the percentage of maximum density specified.
 4. If a compacted layer fails to meet the specified percentage of maximum density, the layer will be recompacted and retested. If compaction cannot be achieved the material/layer will be removed and replaced. No additional material may be placed over a compacted layer until the specified density is achieved.
- B. Open graded Stone: Place material in maximum twelve-inch lifts. Each lift shall be raked smooth and compacted through several passes of a walk behind vibratory roller. Compaction Testing is **not** required.

3.11 ROUGH GRADING

- A. Interior Grading: Trim unexcavated spaces within the building to levels indicated.
 - 1. Subgrade for Interior Slabs: Compact as specified to receive fill material. Finish subgrade surface within 1 inch above or below level specified for fill required.
- B. Exterior Grading: Trim and grade area within the Grading Limit Line and excavations outside the limit line, required by this Contract, to a level of 4 inches below the finish grades indicated unless otherwise specified herein or where greater depths are indicated. Provide smooth uniform transition to adjacent areas.
 - 1. Slope cut and fill in transition areas, outside of the grading limit line, to meet corresponding levels of existing grades at a slope of 1 vertical to 2 horizontal unless otherwise indicated.
 - 2. Landscaped Areas: Provide uniform subgrade surface within 1 inch of required level to receive topsoil thickness specified. Compact fill as specified to within three inches of subgrade surface. Remove objectionable material detrimental to proper compaction or to placing full depth of topsoil. If the top three inches of subgrade has become compacted before placement of topsoil, harrow or otherwise loosen rough graded surface to receive topsoil to a depth of three inches immediately prior to placing topsoil.

3.12 SUBGRADE SURFACE FOR WALKS AND PAVEMENT

- A. Shape and grade subgrade surface as follows:
 - 1. Walks: Shape the surface of areas under walks to required line, grade, and cross section, with the finish surface not more than 1 inch above or below the required subgrade surface elevation.
 - 2. Pavements: Shape the surface of areas under pavement to required line, grade, and cross section, with the finish surface not more than 1/2 inch above or below the required subgrade surface elevation.
- B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.
- C. Thoroughly compact subgrade surface for walks and pavement by mechanical rolling, tamping, or with vibratory equipment as approved to the density specified.

3.14 FINISH GRADING

- A. Uniformly grade rough graded areas within limits of the Grading Limit Line to finish grade elevations indicated.
- B. Grade and compact to smooth finished surface within tolerances specified, and to uniform levels or slopes between points where finish elevations are indicated or between such points and existing finished grade.
- C. Grade areas adjacent to building lines to drain away from structures and to prevent ponding.
- D. Finish surfaces free from irregular surface changes, and as follows:
 - 1. Grassed Areas: Finish areas to receive topsoil to within one inch above or below the required subgrade surface elevations.

2. Walks: Place and compact subbase material as specified. Shape surface of areas under walks to required line, grade, and cross section, with the finish surface not more than 1/2 inch above or below the required subbase elevation.
 3. Pavements: Place and compact subbase material as specified. Shape surface of areas under pavement to required line, grade, and cross section, with the finish surface not more than 1/2 inch above or below the required subbase elevation.
 4. Building Slabs: Grade subbase material smooth and even, free of voids, compacted as specified, and to required subbase elevation. Finish final grades within a tolerance of 1/4 inch when tested with a ten-foot straightedge.
 5. Surfaces To Receive Vapor Barrier: Provide smooth surfaces graded, tamped and/or rolled, entirely free of obstructions or protruding objects.
- E. Spread topsoil directly upon prepared subgrade surface to a depth measuring FOUR inches after natural settlement of the topsoil has occurred in areas to be seeded or to receive sod. Place to greater depth when necessary to adjust grades to required elevations.
1. Approved existing topsoil within the Grading Limit Line may be used. Provide additional topsoil from outside sources as required.
- F. Finish topsoil surface free of depressions which will trap water, free of stones over 1 inch in any dimension, and free of debris.

3.14 MAINTENANCE AND RESTORATION

- A. Restore grades to indicated levels where settlement or damage due to performance of the Work has occurred. Correct conditions contributing to settlement. Remove and replace improperly placed or poorly compacted fill materials.
- B. Restore pavements, walks, curbs, lawns, and other exterior surfaces damaged during performance of the Work to match the appearance and performance of existing corresponding surfaces as closely as practicable.

3.15 DISPOSAL OF EXCESS AND UNSUITABLE MATERIALS

- A. Remove from State property and dispose of excess and unsuitable materials, including materials resulting from clearing and grubbing and removal of existing improvements.
- B. Transport excess and unsuitable materials, including materials resulting from clearing and grubbing and removal of existing improvements, to spoil areas on areas designated by the Engineer, and dispose of such materials as directed.
- C. Transport excess topsoil to areas on property designated by the Engineer. Smooth grade deposited topsoil.

3.16 FIELD QUALITY CONTROL

- A. Compaction Testing: Notify the Engineer at least three working days in advance of all phases of filling and backfilling operations. Compaction testing will be performed by the Engineer to ascertain the compacted density of the fill and backfill materials. Compaction testing will be performed on certain layers of the fill and backfill as determined by the Engineer. If a compacted layer fails to meet the specified percentage of maximum density, the layer will be recompacted and will be retested. No additional material may be placed over a compacted layer until the specified density is achieved.

3.17 PROTECTION

- A. Protect graded areas from traffic and erosion, and keep them free of trash and debris.

END OF SECTION

SECTION 022300 CRUSHED STONE AND GRAVEL

PART 1: GENERAL

1.1 SUMMARY

A. Scope:

- 1. Contractor shall furnish and place crushed stone and gravel of the types specified at locations shown and as ordered by the Owner.

1.2 SUBMITTALS

- A. Contractor shall furnish representative samples of the crushed stone or gravel to the Owner and shall advise of the source location.

PART 2: PRODUCTS

2.1 MATERIALS

A. Pea Gravel:

- 1 Pea gravel shall consist of well graded hard, sound, tough, durable particles of uncrushed gravel free from soft, thin, elongated, or laminated pieces, organic matter, and other deleterious substance. The percentage by weight passing a 2 inch square mesh sieve shall not be less than 95 percent, not less than 95 percent retained on No. 4 sieve and maximum 5 percent passing No. 10 sieve.

B. Crushed Stone/Gravel and Sand:

- 1 Contractor shall furnish and place crushed stone or screened gravel fill under pipe or structures in addition to that required under other Sections. This material shall be placed at such locations as the Owner shall specifically order in writing to replace material unsuitable for the foundations of the pipe or structure or to increase the load carrying capacity of the pipe. It shall also be used to refill over excavations by the Contractor.

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- 2 The material shall be well-graded, clean gravel/ crushed stone and sand obtained from an approved source.

Crushed Stone/Gravel

<u>Sieve Size</u>	<u>Percent Passing</u>
1-1/2-inch	90 to 100%
1 inch	35 to 70%
3/4-inch	0 to 15%
3/8-inch	0 to 5%

Sand

<u>Sieve Size</u>	<u>Percent Passing</u>
3/8-inch	100%
No. 8	75 to 80%
No. 60	10 to 20%
No. 100	less than 5%

- 3 All sand shall consist of clean, hard, durable particles free from organic or other deleterious matter. Crushed stone crushed or uncrushed gravel shall be clean, hard, durable material of acceptable quality.
- 4 Material used on slopes shall be crushed gravel or crushed stone. Screened river gravel is not acceptable.
- 5 Samples of all material shall be submitted to the Owner for approval.

PART 3 EXECUTION

3.1 PLACING

- A. Gravel shall be spread in layers of uniform thickness not exceeding 8 inches and shall be thoroughly compacted with suitable power-driven tampers or other power-driven equipment. The placing of crushed stone or gravel shall conform to applicable requirements of Section No. 02220, Excavation and Backfill, except as noted above.

END OF SECTION

027800 Detectable Warning Pavers

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 Summary

- A. Furnish materials, labor, transportation, services, and equipment necessary to furnish and install Architectural Concrete Pavers as indicated on drawings and as specified herein.
- B. Related Sections include the following:
 - 1. Division 02 - Section 022200 Earthwork.
 - 2. Division 02 - Section 027700 Concrete Paving, Walks, Curbs and Gutters.
 - 3. Division 03 - Section 033000 Cast-In-Place Concrete.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM C-150 -Specification for Portland Cement.
 - 2. ASTM C-33 -Specification for Concrete Aggregates.
 - 3. ASTM C-140 - Specification for Concrete.
 - 4. ASTM C-293
 - 5. ASTM C-1028
 - 6. ASTM C501, 50
 - 7. ASTM C241
- B. Tile Council of America (TCA)
 - 1. TCA F102 - Installation Method Cement Mortar Bonded.
 - 2. TCA F101 - Installation Method Cement Mortar Bonded.
- C. American National Standards Institute (ANSI)
 - 1. ANSI A-118.4 - Latex Portland Cement Mortar.
 - 2. ANSI A-118.6 - Grout - Latex.
- D. Performance Requirements
 - 1. *Compressive Strength*: At the time of delivery, the average compressive strength shall not be less than 8,000psi with no individual unit less than 7,000psi (48,000kPa) per ASTM C-140.
 - 2. *Water Absorption*: Shall not be greater than 6% per ASTM C-936.
 - 3. *Flexural Strength*: Shall not be less than 800psi (5,500kPa) per ASTM C-293.
 - 4. *Freeze/Thaw*: Durability of the paver shall meet the freeze/thaw tests per Section 8 of ASTM C-67 and shall have no breakage and not greater than 1 % loss in dry weight of any individual unit when subject to 50 cycles of freeze/ thaw.
 - 5. *Static Coefficient of Friction*: ASTM C-1028 conditionally slip resistant:
 - a. Wet: 0.50 - 0.60 and Dry: 0.60 - 0.70
 - 6. *Sizing Dimensions*: Shall not differ by more than 1/16 inch (1.6 mm) from width, height, length or thickness. Unit shall conform to a true plane and not differ by

more than 1/16 inch (1.6 mm) in either concave and/or convex warpage.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data:
 - 1. Manufacturer's data sheets on each product to be used, including preparation instructions, Installation methods, Storage and handling requirements and recommendations.
 - 2. Submit test results from an independent testing laboratory for compliance with performance requirements specified herein.
 - 3. Submit two copies of written instructions for recommended maintenance.
- B. Shop Drawings:
 - 1. Layout drawings of each paved area showing the pattern of pavers, indicate pavers requiring cutting, indicate setting bed methods in each area, drainage patterns and drains and indicate and relationship of paving joints. Include details of setting beds, noting all materials and their thickness, show details at curbs and vertical surfaces.
 - 2. Details of custom (nonstandard) curbs and stair tread/risers, include methods of installation.
- C. Samples:
 - 1. Submit two complete sets of color chips representing manufacturer's full range of available colors and texture. Color will be selected by Architect / Engineer / Landscape Architect / Owner from manufacturer's available standard and custom colors.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All products covered under this Section shall be produced by a single manufacturer unless otherwise specified with a minimum of ten (10) years proven production experience.
- B. Installer Qualifications: Installer shall have a minimum of three (3) years proven specialized construction experience with this product and be capable of estimating & building from blueprint plans and details, in addition to proper material handling. All Work must comply with local, state/provincial licensing and bonding requirements.
- C. Special Consideration: The paver manufacturer shall demonstrate, either by proven field performance or a laboratory freeze-thaw test, that the paving units have adequate durability if they are to be subjected to a freeze-thaw environment.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. In accordance with provisions of Section 01300.
- B. Protect Precast Concrete Pavers during shipment, storage and construction against damage. Store a minimum of 4 inches off the ground on pallets in a dry location and cover with polyethylene to protect from contact with materials which would cause staining or discoloration.

- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
 - 1. Do not work during freezing weather or on wet or frozen sub-base.

1.8 WARRANTIES / GUARANTEES

- A. Tile Tech Detectable Warning Pavers shall remain free from defects for a period of ten (5) years. The contractor shall warrant that his work will remain free from defects of labor and materials used in conjunction with his work in accordance with the general conditions for this project or a maximum of three (3) years from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer:
Tile Tech Pavers Inc, 888-380-5575 Phone: (213) 380-5560 Fax: (213) 380-5561
E-mail: sales@tiletechpavers.com Website: www.tiletechpavers.com
- B. Substitutions: Not permitted.
- C. Precast Concrete Pavers equal in appearance and function and meeting these specifications, will be acceptable when the specified submittals are approved in writing by the Architect prior to bid.

2.2 MATERIALS

- A. Concrete Pavers: Detectable Warning or ADA Truncated Dome Pavers as manufactured by Tile Tech
 - 1. Color: Standard and custom range as manufactured by Tile Tech Pavers Inc.
 - 2. Size: Nominal 12"x12"
 - 3. Thickness: 2"
 - 4. Surface Finish: Shot-blasted & Sealed.
 - 5. Edge Finish: 3/16" bevel on all four (4) sides.
 - 6. Weight: 22 lbs per square foot.

2.3 PRECAST MATERIAL REQUIREMENTS

- A. *Portland Cement*: ASTM C-150 specifications for Portland Cement.
- B. *Aggregates*: All aggregates to meet ASTM C-33 specifications, cleaned and properly graded to size. Aggregate shall be blended to meet individual project requirements. Aggregates to meet ASTM C241 & HA 10 minimum.
- C. *Coloring*: Pigments used shall be inorganic, resistant to alkalinity and used per manufacturer's recommendations.
- D. *Color Blending*: Factory-blend pre-cast paver that has a natural color range so products taken from one batch will have the same range as products from a separate batch.

- E. *Cleaner*: Liquid neutral chemical cleaner with pH factor between 7 and 8, of formulation recommended by sealer manufacturer for type of precast paver used.
- F. *Sealer*: Colorless, slip and stain resistant penetrating or acrylic sealer with pH factor between 7 and 10 that does not affect color or physical properties of precast paver surface.

2.4 INSTALLATION MATERIALS

A. Sand-Set Method

1. *Sand Setting Bed Material*: Sand shall be common sand generally referred to as concrete sand and shall be free of organic materials and any other contaminants that could potentially stain or otherwise damage the unit pavers.
2. *Joint Filler Materials*: Sand conforming with ASTM C-144 with 100% passing a No.16 sieve.
3. *Landscape Filter Fabric*: Woven or non-woven non-biodegradable filter between the compacted base and the sand leveling bed.
4. *Preformed Asphalt Joint Filler*: As indicated on drawings: ASTM D-994, 1/2inch (13 mm) thick, for expansion joints which are not sealed, one of the following:
 - a. *Code 1301* by W.R. Grace and Co.
 - b. *Asphalt Expansion Joint* by W. R. Meadows, Inc.
 - c. *Elastite Asphalt Expansion Joint* by The Celotex Corporation.

B. Mortar Setting Bed (Thin-Set) Method - PEDESTRIAN

1. *Latex Mortar Mix*: ANSI A-118.4.
2. *Water*: Clean and free of deleterious acids, alkalies or organic materials.
3. *Grout*: ANSI A-118.6, Grout - Latex.
4. *Sealant, Back-up & Bond Breaker*: As specified in Section 07920 - Sealants and

Caulking.

C. Portland Cement Setting Bed (Thick-Set) Method

1. *Portland Cement Mortar Mix*: ASTM C-150 Custom Bldg Products thick Bed Mortar Mix with Admix, or approved equal.
2. *Reinforcement*: 2inches by 2inches (51mm by 51mm) - 16/16 welded galvanized wire mesh used in thick mortar bed.
3. *Water*: Clean and free of deleterious acids, alkalies or organic materials.
4. *Grout*: Custom Bldg Products Grout with Admix, color as selected or approved equal.
5. *Bond Slurry*: Custom Bldg Products bond coat or approved equal.
6. *Sealant, Back-up & Bond Breaker*: As specified in Section 07920 - Sealants and

Caulking.

D. Bituminous Setting Bed Method

1. *Asphalt Setting Bed Materials*:
 - a. *Asphalt Cement*: ASTM D-3381, viscosity grade AC-10 or AC-20.
 - b. *Fine Aggregate*: Clean, hard sand, free of organic matter, uniformly graded from coarse to fine, all passing the No.4 sieve meeting the gradation requirements when testing in accordance with ASTM-C136.
 - c. *Mixing*: Provide plant mixed asphalt setting bed by combining approximately 93% dry fine aggregate and approximately 7% hot asphalt cement and heat to approximately 300 degrees F (149 degree C). Provide

each ton of setting bed material apportioned by weight with the approximate ratio of 145lb (66kg) of asphalt to 1,855lb (841kg) of sand.

2. *Setting Bed Primer*: Cut back asphalt, ASTM D-2028, grade as recommended by manufacturer.
3. *Asphalt Adhesive*: Standard neoprene modified asphalt adhesive containing oxidized asphalt combined with 2% neoprene and 10% long fibered mineral fibers with a softening point of 155 degrees F.
4. *Joint Filler Materials*: Sand conforming to ASTM C-144 with 100% passing a No.16 sieve.
5. *Pre-formed Asphalt Joint Filler*: ASTM D-994, 1/2inch (13mm) thick, for expansion joints which are not sealed, one of the following:
 - a. *Code 1301* by W.R. Grace and Co.
 - b. *Asphalt Expansion Joint* by W. R. Meadows, Inc.
 - c. *Elastite Asphalt Expansion Joint* by The Celotex Corporation.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Prior to starting work inspect the sub-grade to ensure that it has been properly prepared. Commencement of work shall imply acceptance of sub-grade conditions.
 1. Verify that sub-grade preparation, compacted density and elevations conform to the specifications. Compaction of the soil sub-grade to at least 95% Standard Proctor Density per ASTM D-698 is recommended. Higher density or compaction to ASTM D-1557 may be necessary for areas subject to vehicular traffic.
 2. Stabilization of the sub-grade and/or base material may be necessary with weak or saturated sub-grade soils. The Architect/Engineer should inspect sub-grade preparation, elevations, and conduct density tests for conformance to specifications.
 3. Verify that Geotextiles, if applicable, have been placed according to specifications.
 4. Verify that aggregate base materials, thickness, compaction, surface tolerances, and elevations conform to the specifications.
 5. Verify that base is dry, uniform, even, and ready to support sand, pavers, and imposed or anticipated vehicular loads.
 6. Verify location, type, installation and elevations of edge restraints around the perimeter area to be paved.
- B. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with Tile Tech Pavers Inc. and other contributing manufacturer's

instructions. Installation requirements vary for each individual project site. Precast Pavers used, pattern, grid layout, starting point, and finished elevation should be shown on plan view shop drawings, which have been prepared and approved by the designer, installing contractor and/or owner.

B. Placement Tolerance:

1. Maximum of 1/16 inch (1.6 mm) height variation between adjacent pavers.
2. Individual pavers shall not vary more than 1/16 inch (1.6mm) from level across width of the paver.
3. Paved areas shall not vary more than 1/4 inch (6 mm) from level in a distance of 10 feet (3m) measured at any location and in any direction.
4. The surface elevation of pavers shall be 1/8 in. to 1/4 in. (3mm to 6mm) above adjacent drainage inlets, concrete collars or channels.
5. Joints between pavers to be 3/16 inch (4.8mm) or 1/8 inch (3mm).
6. Concrete shall not exceed 1/8 inch in 10 feet (3 mm in 3 m) from required plane. Concrete to be steel troweled with fine broom finish. No curing or sealing compound used.

C. Sand-Set Method Installation:

1. Spread a sand/cement mix evenly over the base course and screed to a nominal 1 in. (25 mm.) thickness, not exceeding 1-1/2 in. (40mm) thickness. The screened sand should not be disturbed. Place sufficient sand to stay ahead of the laid pavers. Do not use the bedding sand to fill depressions in the base surface.
2. Lay the pavers in the pattern(s) as shown on the drawings. Maintain straight pattern lines.
3. Field cut pavers with wet masonry saw in accordance with manufacturer's recommendations for methods, equipment and precautions.
4. Tamp into bedding or use a low amplitude, high frequency plate vibrator to vibrate the pavers into the sand. Cover vibrator plate with carpet or card board to prevent surface damage to pavers.
5. Sweep dry joint sand into the joints & sweep off excess sand when the job is complete.

D. Mortar Setting Bed (Thin-Set) Method Installation - PEDESTRIAN

1. Installation of Mortar bed as per TCA F102. All Materials used shall follow instructions of manufacturer for use in mortar method.
2. Install precast concrete pavers.
3. Grouting of pavers in strict accordance with grout manufacturer's directions and instructions. Use latex or acrylic additives from the same manufacturer as the grout.
4. All expansion and Control joints shall be installed per TCA EJ171. Joint materials used shall follow manufacturer's directions and instructions.
5. Rework mixes from time to time to maintain proper consistency, as recommended by manufacturer but do not add ingredients. Discard mortar that has reached its initial set.
6. Field cut pavers with wet masonry saw in accordance with manufacturer's recommendations for methods, equipment and precautions.
7. Remove, scrub & wash clean mortar stains and all other types of soiling from

exposed paver surfaces.

E. Portland Cement Setting Bed (Thick-Set) Method Installation

1. Installation of Mortar bed as per TCA F101. All materials used follow instructions of manufacturer for use in mortar method.
2. Install precast concrete pavers and firmly set, tamp into bedding to ensure minimum 95% surface contact with mortar bed. Coat underside of each precast pavers unit with latex cement mortar.
3. Grouting of pavers in strict accordance with grout manufacturer's directions and instructions. Use latex or acrylic additives from the same manufacturer as the grout.
4. All expansion and Control joints shall be installed per TCA EJ171. Joint materials used shall follow manufacturer's directions and instructions.
5. Field cut pavers with wet masonry saw in accordance with manufacturer's recommendations for methods, equipment and precautions.
6. Remove, scrub & wash clean mortar stains and all other types of soiling from exposed paver surfaces.

F. Bituminous Setting Bed Method Installation

1. Place solid steel 3/4 inch (19 mm) thick control bars directly on the base or slab. Install shims under bars for minor adjustment of depth and finish paver elevations. Space bars approximately 11 feet (3.4m) apart and parallel to each other to serve as guides for strike-off boards.
2. Place asphalt setting bed at not less than 200 degrees F (93 degree C) in panels between control bars on the primed concrete slab or binder course to no less than 3/4 inch (19mm) compacted thickness. Spread material and strike off by pulling the material with a 12 feet long by 2 inches by 6 inches (3.7m by 51mm by 152mm) wood board several times to produce a smooth firm and even setting bed. Add fresh material in low, porous spots after each pass of the strike-off board. After each panel is complete remove and advance the first control bar to the next panel position in readiness for placing and striking adjacent panels. Fill in depressions left by the control bar.
3. Roll setting bed with a roller (not over one ton in weight) to a nominal depth of 3/4 inch (19 mm) thick while it is still hot. Add additional material to adjust thickness required and to allow for setting of pavers to finish elevations and slopes.
 - a. If setting bed is installed greater than 1-1/2 inches (38mm) thick, place in two equal lifts. Place the second lift immediately after the first to assure bond between lifts.
 - b. If pavers are not installed immediately after setting bed, provide protection of setting bed with minimum 1/2 inch plywood sheet laid on the setting bed with butted joints. Repair all damage to the setting bed prior to installing pavers.

F. Concrete Slab Installation – VEHICULAR

1. Install precast concrete pavers, slabs and curbs in locations, patterns and at elevations and with slopes for surface drainage as shown on the Drawings and in accordance with the manufacturer's printed installation instructions and the final reviewed shop drawings.
2. Apply neoprene modified asphalt adhesive on the cured setting bed by

squeegeeing or troweling. If troweled on, use a trowel with serrations not exceeding 1/16 inch (1.5 mm) depth. Place adhesive to not more than 1/16 inch (1.6mm) thickness over the total surface of the setting bed. Do not begin installation of pavers, slabs and curbs until adhesive is dry to the touch.

3. Lay out pavement in 30 feet (9m) working area modules. Set precast concrete pavers, slabs and curbs by hand on dry adhesive in patterns shown on the Drawings with hand tight joints 1/16 inch to 1/8 inch (1.6 mm to 3 mm) wide joints and uniform top surfaces.
4. Field cut pavers with wet masonry saw in accordance with manufacturer's recommendations for methods, equipment and precautions.
5. Maintain accurate alignment and check for creep and shrinkage. Make adjustments to creep and shrinkage within the 30 feet (9 m) module area.
6. Sweep fine dry sand over pavement surface to fill joints immediately after installing pavers, slabs and curbs on setting bed. Brush in sand until joints are completely filled, remove surplus sand. Do not allow traffic on installed pavers, slabs or curbing until the joints have been filled.
7. Protect newly laid pavers, slabs and curbs with plywood panels on which workers stand. Advance protective panels as work progresses but maintain protection in areas subject to continued movement of materials and equipment to avoid creating depressions or disrupting alignment of installed pavers, slabs and curbs.
8. Install the specified joint filler where precast concrete pavers, slabs and curbs abut curbs, other vertical surfaces and other construction.
9. After the precast concrete paving is completed, backfill the spaces along the edges of the walks, metal edging and pavements to the required elevations with material reviewed by the Testing Laboratory. The Material shall then be compacted until firm and the surface neatly graded, with allowance made for top soil.

3.4 PROTECTION

- A. Protect installed pavers until completion of project.
- B. Remove and replace pavers which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment to eliminate evidence of replacement before Substantial Completion.

3.5 CLEANING & SEALING

- A. Wash entire surface with phosphate free neutral cleaner with pH factor between 7 to 10 and rinse with clean water and allow to dry thoroughly.
- B. Apply sealer in accordance with manufacturer's directions.
 1. pH factor between 7 and 10
 2. Non-discoloring and UV resistant.
 3. Penetrating type designed especially for precast concrete pavers.

3.6 MAINTENANCE

- A. Extra Materials: Deliver supply of maintenance materials to the owner. Furnish not less than 1 percent maintenance materials from same lot as materials installed, and enclosed in protective packaging with appropriate identifying labels.

**END OF SECTION 027800
DETECTABLE WARNING PAVERS**

SECTION 321216 NEW ASPHALT PAVEMENT

PART 1: WORK

1.01 NEW PAVEMENT

Under this work, the Contractor shall furnish and install new asphalt pavement. All labor and materials for and the proper placement of asphalt pavement as required to complete the construction of the work included under this Contract shall be included in this item. Final grading and preparation of the subgrade including removal of temporary asphalt pavement and sub-base material shall be incidental to this work. No additional payment will be made.

Upon completion of all underground installations and curbing the Contractor may install all new pavement sections in the driveway and trench repair areas. This will occur when final sub-grade elevation and compaction is met and accepted by the Engineer. First, the base course and binder course will be placed to the depths shown. Upon completion of all site work which would no longer require any activity or use of heavy equipment which would cause damage, the final course of asphalt can be installed to the required depth. All work will be in conformance with the Contract Documents and Specifications unless otherwise directed by the Engineer.

1.02 REPLACEMENT PAVEMENT

The Contractor, under this Item, will furnish all the labor and materials for and will properly place the pavement removed or disturbed in the construction of the work included under this Contract.

In all locations where asphalt has been removed and requires replacement a base course will be placed over trenches, and a tack coat and bituminous concrete pavement placed as the permanent pavement surface. This will be done in accordance with the plans and specifications.

1.03 REFERENCES

In general, all work and materials will conform to the latest revision and addenda to the New York State Department of Transportation Standard Specifications for Construction and Materials, which is referred to herein as NYSDOT Standard Specifications dated May 1, 2008.

1.04 SUBMITTALS

A. Quality Control Submittals:

1. Plant name and location of asphalt concrete supplier.
2. Delivery receipts and certificates of asphalt product.

1.05 PROJECT CONDITIONS

A. Environmental Requirements:

1. Discontinue paving when surface temperatures fall below requirements listed in DOT Table 402-2.
2. Do not place asphalt concrete on wet surfaces, or when weather conditions otherwise prevent the proper handling or finishing of bituminous mixtures as determined by the Engineer.

PART 2: MATERIALS

2.01 MATERIALS

All materials will conform to NYSDOT Standard Specifications.

The temporary and permanent pavement used on all roads, shoulders, driveways and parking areas will be bituminous concrete pavement conforming to NYSDOT Standard Specifications, Section 403.

The Item 4 will conform to NYSDOT Standard Specifications, Section 304, Type 4.

2.01A FOUNDATION COURSE FOR ROADWAY (ITEM 304.04)

The foundation course shall consist of placing a compacted layer of New York State D.O.T. Item #304.05 Type 4 granular material of the NYSDOT Standard Specifications, dated May 1, 2008, upon a properly prepared sub-grade to a depth as shown on the Contract Drawings. Prior to placing the foundation course, the finished sub-grade surface shall not extend above the design elevation at any location. The foundation material shall be spread on the grade by a procedure that minimizes particle segregation. The depth of loose spread lifts shall not exceed those permitted by the type and classification of the compactor utilized. Water shall be added in such amounts as the Engineer, or his representative, may consider necessary to secure satisfactory compaction. The final surface of the foundation course shall be fine graded so that, after final compaction and just prior to placement of the binder pavement course, the surface elevation shall not vary more than one-quarter inch above or below the design line and grade shown on the Contract Drawings. The surface shall be completed to the above tolerance and approved by the Engineer, or his representative, prior to placing of the binder course. If, after approval, the foundation course becomes displaced or disturbed in any way for any reason, the Contractor shall repair and re-grade and damaged areas to the satisfaction of the Engineer, or his representative, prior to placing the binder course.

2.01B HOT MIX ASPHALT CONCRETE BINDER

Work under this item shall consist of placing a binder course of hot, plant mixed, asphalt concrete binder NYSDOT Item No. 403.138902, in the trench areas as shown on the Contract Drawings, or as required by the Engineer, or his representative.

2.01C HOT MIX ASPHALT CONCRETE TOP COURSE

Work under this item shall consist of placing a compacted pavement course of hot, plant mixed asphalt concrete top NYSDOT. Item No. 403.178302, in accordance with these Specifications and in reasonably close conformity with the required lines, grades, thicknesses and typical sections as shown on the Contract Documents or established by the Engineer, or his representative.

The pavement shall be so constructed that the final compacted thickness is as near to the nominal thickness as is practical. A tolerance not to exceed one-quarter (1/4") inch from the nominal thickness will be acceptable.

The surface shall be tested with a sixteen (16') foot straight edge or string line placed transversely to the center line of the street on any portion of the street surface. Variations exceeding one-quarter (1/4") inch shall be satisfactorily eliminated or the pavement re-laid at no additional cost to the Owner. The mixture shall be transported from the mixing plants to the work site in tight vehicles previously cleaned of all foreign materials and each load shall be covered with canvas or other suitable material of sufficient size and thickness to protect it from weather conditions. The mixture shall be laid upon a clean dry surface, spread and struck off to the established grade and elevation. Approved bituminous pavers shall be used to distribute the mixture either over the entire width or over such partial width as may be practicable.

The bituminous pavers shall be in the charge of an experienced operator.

Placing of the mixture shall be continuous at a desired rate of not less than fifty (50) tons per hour. The Engineer, or his representative, may permit a lesser rate if satisfactory results are achieved. Upon arrival at the site, the mixture shall be dumped into the paver and immediately spread and struck off to the width required and placed to a loose depth so that when the work is completed, the required compacted thickness of the mixture will be obtained.

Before any rolling is started, the finished surface struck off by the paving machine shall be checked and any surface irregularities adjusted. Immediately after the bituminous mixture has been placed, it shall be thoroughly and uniformly compacted by rolling. The surface shall be rolled when the mixture is in the proper condition and when the rolling does not cause undue displacement, cracking and shoving. Under no circumstances will compaction be permitted if the mix temperature drops below 200°F. Said material shall be removed from the site.

The course shall be initially rolled with an approved ten (10) to twelve (12) ton steel wheel tandem roller. During the initial rolling, the roller shall travel parallel to the centerline of the pavement, beginning at each edge and working toward the center, overlapping on successive trips by one-half the width of the roller. Immediately following the initial rolling, the course shall be rolled with a ten (10) to twelve (12) ton steel wheel roller a minimum of eight (8) passes per lane.

Immediately following the above intermediate rolling, the course shall be finished rolled with a ten (10) to twelve (12) steel wheel roller. This final rolling shall be both longitudinal and diagonal as directed by the Engineer, or his representative, and shall remove shallow ruts and ridges and other irregularities from the surface. Rolling shall be continued until all roller marks are eliminated.

Rollers shall move at a slow and uniform speed not exceeding three (3) miles per hour unless otherwise approved. The roller drive roll shall be nearest the paver.

To prevent adhesion of the bituminous mixture to the rollers, the rollers shall be kept properly moistened with water.

In areas not accessible to the rollers, the mixture shall be thoroughly compacted with approved mechanical tampers as directed by the Engineer, or his representative.

Suitable means shall be provided to keep pavers, and other equipment and tools, free from bituminous accumulations. The surface of the pavement shall be protected from drippings of oil, kerosene, or other materials used in paving and cleaning operations.

The Contractor may be required to adjust and change both the equipment and the compaction procedure as directed by the Engineer, or his representative, if conditions, as determined by the Engineer, so warrant.

In placing and compacting abutting courses of bituminous concrete pavement, joint heater devices shall be used on all joints, both transverse and longitudinal. These joint heater devices shall be of the infrared type or equal. Direct flame heaters shall not be used. The joint heater devices will be so constructed as to permit adjustment of the heat applied to the joints.

The bituminous plant mix shall not be placed on any wet surface, or when the surface temperature is less than 45°F (7.2°C), when weather conditions otherwise prevent the proper handling or finishing of the bituminous mixture as determined by the Engineer, or his representative.

The bituminous top course shall only be placed during the period of April 1 to November 15 or as directed by the Engineer.

2.02 ASPHALT TACK COAT

Tack coat material shall be in accordance with NYS DOT Item 702-30, material designation RS-1.

2.03 TRAFFIC LOADING

Traffic shall be diverted away from newly paved areas until such time that the surface is totally cooled and has set to the extent that traffic will cause marks, indentation, or displacement of asphalt. All work shall be done in strict conformance with the requirements of the Village and as set forth in the NYSDOT Standard Specifications.

PART 3: MEASUREMENT AND PAYMENT

4.01 DESCRIPTION

The cost for this work item shall be included as a lump sum price for paving and shall include the cost of furnishing all labor, materials and equipment including but not limited to the removal of any temporary pavement, raising of all manhole frames; cutting and cleaning of pavement edges; final grading including sub-base material, supplying and applying the tack coat; supplying and applying permanent bituminous concrete pavement, and furnishing of all labor, materials, tools, equipment and appliances, and incidental work and the removal and disposal of surplus material required to complete the work in accordance with the Contract Documents and Specifications, and to the satisfaction of the Engineer.

END OF SECTION

SECTION 032000 CONCRETE REINFORCEMENT

PART 1: GENERAL

1.01 DESCRIPTION

- A. Work Included: Under this Section, the Contractor shall provide all labor, equipment, and material necessary to furnish and install all steel required for the concrete work placed and as shown on the Contract Drawings, specified herein and approved by the Village of Ossining.

1.02 QUALITY ASSURANCE

A. Standards:

1. ACI 301: Specifications for Structural Concrete for Buildings.
2. ACI 302: Guide for Concrete Floor and Slab Construction.
3. ACI 315: Details and Detailing of Concrete Reinforcement.
4. ACI 315R: Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.
5. ACI 318: Building Code Requirements for Reinforced Concrete.
6. AWS D1.1-92: Structural Welding Code - Reinforcing Steel.
7. CRSI: Manual of Standard Practice.

- B. Allowable Tolerances: Conform to ACI 301, Section 5.4.

1.03 SUBMITTALS

- A. General: Submit shop drawings and samples in accordance with Section No. 01300, Submittals.

- B. Shop Drawings: The Contractor shall submit complete shop drawings of all material proposed to be furnished and installed under this Section.
1. Show detail layouts of jointing and reinforcement, including dimensions, openings and spacings; embedded items; bending details; bar schedules; welds; and similar items required for the proper construction of this work.
 2. Detail the reinforcement in accordance with ACI 315, ACI 315R and CRSI Manual.
 3. Include the bar schedules, the individual weight of each bar, the total weight of each bar size and the total weight of bars on each schedule list. Base the calculated weights on the theoretical unit weights shown in Table 1, ASTM A615.
 4. Include in the minimum concrete cover for reinforcement.
- C. Samples: Accompanying the above submittal, submit samples of exposed-to-view bolsters and supports.
- D. Mill Certificates: Accompanying the shop drawings, submit steel producer=s certificates of mill analysis, tensile and bend tests for reinforcing steel.

1.04 **PRODUCT HANDLING**

- A. Delivery: Deliver reinforcement to the job site bundled, tagged and marked. Use metal tags indicating bar size, lengths and other information corresponding to markings shown on placement diagrams.
- B. Storage: Store reinforcement at the job site in a manner to prevent damage and accumulation of dirt and excessive rust.

PART 2 PRODUCTS

2.01 **GENERAL**

- A. Conform to ACI 301, ACI 315 and ACI 315R unless otherwise shown or specified.

2.02 **MATERIALS**

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed, epoxy coated.
- B. Steel Wire: ASTM A 82, plane, cold drawn steel.
- C. Welded Wire Fabric (WWF): Welded Wire Fabric shall be welded steel wire fabric and shall conform to ASTM A 185. All fabric shall be hot-dipped galvanized after fabrication to produce a Class 2 coating equal to that specified in ASTM A 641, Table 1.
- D. Supports for Reinforcement: Bolster, chairs, spacers and other devices for spacing, supporting and fastening reinforcement in place:
 - 1. Use wire bar type supports complying with CRSI recommendations unless otherwise indicated. Do not use wood, brick and other unacceptable materials.
 - 2. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 - 3. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with either plastic protected legs or stainless-steel legs.

2.03 FABRICATION

- A. General: Fabricate reinforcing bars to conform to required shapes and dimensions with fabrication tolerances complying with CRSI Manual. In case of fabricating errors, do not rebend or straighten reinforcement in a manner that will injure or weaken the material.
- B. Unacceptable Materials: Reinforcement with any of the following defects will not be permitted in the work:
 - 1. Bar lengths, depths and bends exceeding specified fabrication tolerances.
 - 2. Bend or kinks not indicated on drawings or final shop drawings.
 - 3. Bars with reduced cross-section due to excessive rusting or other cause.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine the sub-grade conditions, form work and the conditions under which concrete reinforcement is to be placed and correct conditions which would prevent proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General:

1. Comply with the specified standards for details and methods of reinforcement placement and supports and as herein specified.
 2. Clean reinforcement to remove loose rust and mill scale, earth and other materials which reduce or destroy bond with concrete.
 3. Position, support and secure reinforcement against displacement of form work, construction or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers as required.
 4. Place reinforcement to obtain the minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports together with sixteen (16) gauge wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
 5. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.
 6. Provide sufficient numbers of supports and of strength to carry reinforcement. Do not place reinforcing bars more than two (2) inches beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
- B. Splices: Provide standard reinforcement splices by lapping ends, placing bars in contact and tightly tying wire. Where welded splices are approved, conform to AWS D1.1-92.
- C. Encase Steel Members: Unless otherwise shown wrap structural steel members to be encased in concrete with 6-inch x 6-inch mesh of ten (10) gauge galvanized steel wire applied around the steel over spacers to provide 3/4-inch clearance from the metal. Lap and tie the edges of the mesh and make all loose ends fast with not lighter than sixteen (16) gauge wire.

- D. Application of Standards: For all items presented in these specifications, where- ever a conflict arises regarding which standards are to apply, the more rigorous standard or code shall be dedeed to apply.

END OF SECTION

SECTION 033000 CAST IN PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

- A. Under this Section, the Contractor shall provide all labor, equipment, and materials necessary to furnish, install and test all cast-in-place concrete complete in place and as shown on the Contract Drawings, specified herein and approved by the Owner.

1.02 RELATED WORK

Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and other specifications in this bid document.

1.03 QUALITY ASSURANCE

A. Standards:

1. ACI 211.1: Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
2. ACI 214: Recommended Practice for Evaluation of Strength Test Results of Concrete.
3. ACI 301: Specifications for Structural Concrete for Buildings.
4. ACI 302: Guide for Concrete Floor and Slab Construction.
5. ACI 304R: Guide for Measuring, Mixing, Transporting and Placing Concrete.
6. ACI 304, 2R: Placing Concrete by Pumping Methods.
7. ACI 305R: Hot Weather Concreting.
8. ACI 306R: Cold Weather Concreting.
9. ACI 308: Standard Practice for Curing Concrete.
10. ACI 309: Standard Practice for Consolidation of Concrete.
11. ACI 318: Building Code Requirements for Reinforced Concrete.
12. ACI SP-2: ACI Manual of Concrete Inspection.
13. National Ready-Mixed Concrete Association (NRMCA): Certification of Ready-Mixed Concrete Production Facilities.
14. Truck Mixer Manufacturer's Bureau (TMMB): Truck Mixer and Agitator Standards.
15. Concrete Plant Manufacturer's Bureau (CPMB): Concrete Plant Mixer Manufacturer's Division.
16. In case of conflict between the referenced standards, the more stringent requirements shall govern.

B. Qualifications of Installers:

1. Throughout the progress of installation of the work of this Section, provide at least one (1) person who shall be thoroughly familiar with the specified requirements, completely trained and experienced in the necessary skills and who shall be present at the site and direct all the work performed under this Section.
2. In actual installation of the work of this Section, use adequate numbers of skilled workmen to ensure installation in strict accordance with the approved design.
3. In acceptance or rejection of work performed under this Section, the Owner will make no allowance for lack of skill on the part of the workmen.

B. Quality Control:

1. Prior to all work under this Section, make all necessary arrangements with the testing laboratory. The testing laboratory shall:
 - a. Test and furnish certified reports on:
 - i. Proposed aggregates
 - ii. Proposed cements unless such testing is waived by the Owner.
 - iii. Mixing water.
 - b. Prepare design mixes for each type of concrete. Conform to ACI 301, Section 3.8. These mix designs shall be prepared under the supervision of a Professional Engineer experienced in the special considerations of materials and mixes.

- c. Proportion mixes by laboratory trial batch using materials to be employed on the work for each class of concrete required. Conform to ACI 211.1 and report the following to the Owner.
 - i. Complete identification of aggregate source of supply.
 - ii. Results of tests of aggregates for compliance with specified requirements.
 - iii. Scale weight of each aggregate.
 - iv. Absorbed water in each aggregate.
 - v. Brand, type, chemistry, and physical test for each cement.
 - vi. Brand, type, and amount of each admixture.
 - vii. Amounts of water used in trial mixes.
 - viii. Proportions of each material per cubic yard.
 - ix. Gross weight and yield per cubic yard of trial mixes.
 - x. Measured slump.
 - xi. Water-cement ratio.
 - xii. Measured air content.
 - xiii. Compressive strength developed at one (1) calendar day, three (3) calendar days, seven (7) calendar days and twenty-eight (28) calendar days, from not less than three (3) test cylinders cast for each one (1), three (3), seven (7) and twenty-eight (28) calendar day test and for each design mix.
 - d. Furnish certified reports of each proposed mix for each type of concrete at least thirty (30) calendar days prior to start of installation of the work of this Section.
- 2. Do not begin concrete production until all mixes have been reviewed by the Owner.
 - 3. Also see other requirements for testing as stated in Part 3 Execution of this Section.

1.4

SUBMITTALS

- A. General: Submit shop drawings and product data.
- B. Product Data:
 - 1. Complete materials list of items to be furnished and installed under this Section.
 - 2. Sufficient data to demonstrate compliance with the specified requirements, including catalog cuts of the following:
 - a. Admixtures
 - b. Curing compound
 - c. Grout
 - d. Bonding agent
 - e. Abrasive
 - f. Floor sealer
 - 3. Complete information on cement source of supply, physical and chemical characteristics, transportation and intermediate terminaling procedures for mill-to-site handling and site storage procedures.
 - 4. Complete information on aggregate procurement, processing, and storage.

5. Complete information on proposed batching and mixing equipment and procedures including water chilling or other devices or systems to reduce mix temperatures.
 6. Complete information on concrete handling equipment proposed to be used including capacities for chutes, pumps, tremies, buckets and all other equipment.
 7. Complete information on proposed consolidation equipment.
 8. Complete description of proposed curing methods.
 9. Complete mix designs, prepared in accordance with provisions of subparagraph 1.2.C above.
- C. Temperature Control Methods: Prior to placing concrete during hot or cold weather, submit proposed methods of controlling concrete temperatures.
- D. Batch Tickets: With each batch delivered and before unloading at the site, submit to the Owner certification or delivery ticket from concrete supplier setting forth the following information:
1. Name of supplier.
 2. Name of batching plant and location.
 3. Serial number of tickets.
 4. Date.
 5. Truck number.
 6. Specific job designation (contract number and location).
 7. Volume of concrete (cubic yards).
 8. Specific class and type of concrete (in conformance with specification requirements).
 9. Time loaded.
 10. Type and brand of cement.
 11. Weight of cement.
 12. Maximum size of aggregates.
 13. Weights of coarse and fine aggregates, respectively.
 14. Maximum amount of water to be added and amount of water added at the site, if any.
 15. Kind and amount of admixtures.
 16. Computer tape from plant with definitions of symbols.

E.

1.5 PRODUCT HANDLING

- A. General: Conform to ACI 301 and ACI 304.
- B. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the work and materials of all other trades.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner and at no additional cost to the Owner.

1.6 JOB CONDITIONS

- A. Environmental Requirements:
 1. Cold Weather Concreting: Conform to ACI 301 and ACI 306R.
 2. Hot Weather Concreting: Conform to ACI 301 and ACI 305R.
- B. Protection: Conform to ACI 301, Chapter 12 and ACI 302, Chapter 8.

1.7

PART 2 PRODUCTS

2.1 GENERAL

- A. Conform to ACI 301 and ACI 302 unless otherwise shown or specified.

2.2 CEMENT

A. General:

1. Portland, conforming to ASTM C150, except that twenty-eight (28) calendar day cube strength shall be a minimum of 5,500 pounds per square inch.
2. Cement shall be Type I or Type II. All concrete in contact with sewage shall employ Type II cement. Elsewhere, Type I cement may be used.
3. Do not use cement having a temperature greater than 140 degrees F.
4. Do not use air-entraining cement.

B. Sequence of Use: Use only one brand of cement for the entire work and use in the same sequence as received at the site.

C. Mill Tests: Furnish mill tests for all cement. The twenty-eight (28) calendar day cube strength results may be submitted in a separate report but shall be related to the specific batch tested.

2.3 AGGREGATES

A. General: Conform to ASTM C33, except as modified below.

B. Coarse Aggregate:

1. Crushed stone, ASTM C33.
2. Quarried or washed in fresh water.
3. Limits for deleterious substances and physical property requirements in accordance with ASTM C33, Table 3, Classes 1S through 5S.

C. Fine Aggregate:

1. Natural sand or stone sand, ASTM C33.
2. Washed in fresh water.

D. Aggregate Sources: Provide aggregate from one source of supply only.

E. Aggregate Sizes: Maximum aggregate size shall be not larger than one-fifth of the narrowest dimension between sides of forms, one-third of the depth of slabs nor three-fourths of the minimum clearing space between individual reinforcing bars or bundles of bars.

2.4 WATER

A. Water for use in concrete shall be free from objectionable quantities of oil, acid, alkali, organic matter, salt, or other impurities and shall be similar in quality to drinking water fit for human consumption.

B. Water for curing shall not contain any substance injurious to concrete or which might cause staining.

C. Water from doubtful sources, as determined by the Owner, shall not be used until tested and approved.

2.5 ADMIXTURE

A. General: The use of admixtures shall not be construed as permitting a reduction in cement content.

B. Air-entraining Admixture: ASTM C260.

C. Water Reducing and Retarding Admixture: ASTM C494, Type A.

- D. Pumping Aid Admixture: Euclid Chemical "Pump-Ez," W.R. Grace "Darex Pumping Aid", Sika "Pump Aid" or approved equal.
- E. Accelerating Admixture: Not permitted.
- F. Calcium Chloride: Not permitted.
- G. Fly Ash: Not permitted.
- H. Acceptable Substitutes: The Owner will consider only those proposed admixture substitutions which have been completely tested and reported upon by the testing laboratory in accordance with the provisions of subparagraph 1.2.C (1) above.

2.6

CURING MATERIALS

- A. Liquid Curing Compounds: ASTM C309, Type 1.
- B. Sheet Materials: ASTM C171.
- C. Burlap Cloth: Jute or kenaf, weighing approximately nine (9) ounces per square yard, AASHTO M 182, two (2) layers.

2.7

BATCHING, MIXING AND DELIVERY EQUIPMENT

- A. Use transit-mixed concrete from approved batching and mixing plant. Batch, mix and transport concrete to site in accordance with provisions of ASTM C94.

2.8

PROPORTIONING OF CEMENT

- A. General:
 - 1. Classes of concrete are designated by numerals corresponding to their twenty-eight (28) calendar day compressive strength in pounds per square inch.
 - 2. Concrete classes are indicated on the drawings and are specified in various sections of these specifications. When class is not indicated or specified, Class 4000 shall be provided.
- B. Water-cement Ratio: 0.45 maximum, by weight.
- C. Slump:
 - 1. Minimum Slump: One (1) inch.
 - 2. Maximum Slump:
 - a. Footings, foundations walls: 3 inches
 - b. Walls, columns, beams: 4 inches
 - c. Floors, exterior slabs, other building components: 3 inches
 - d. Massive concrete: 2 inches

3. If pumping of concrete is permitted by the Owner, the maximum slump may be increased by one (1) inch.
- D. Air Content: In accordance with ACI 301 and ACI 302.
- E. Admixtures:
1. Use air-entraining admixture in all concrete. Add air-entraining admixture
 2. Use admixtures for water-reducing and retarding in compliance with manufacturer's directions.
 3. Use type of admixture appropriate to climatic conditions prevailing at time of placing. Adjust quantities and types of specified admixtures as required to maintain quality.
- F. Pumped Concrete:
1. General:
 - a. If pumped concrete is proposed for use, design and submit mixes specifically for pumping and obtain the Owner's written permission to use the pumping method.
 - b. Conform to ACI 304, 2R.
 2. Use admixtures that will aid in pumping as follows:
 - a. Air-entrainment sufficient for 5 to 7 percent air.
 - b. Water reducer.
 - c. Pumping aid.
 3. To facilitate pumping, adjust the standard mix proportion to product a slight reduction in the volume of coarse aggregate with a corresponding increase in the volume of fine aggregate.
 4. Cement content shall be sufficient to accommodate the specified slump.
 5. Use fine aggregates with the fineness modulus between 2.2 and 2.8. Use gradations indicated in ACI 304, 2R, paragraphs 4.2.2, 4.2.3, 4.3.4 and 4.3.5.
 6. Use a properly combined coarse and fine aggregate gradation by volume that will prevent the paste from being squeezed through the voids between aggregate particles.

PART 3 EXECUTION

3.1 MIXING, CONVEYING AND PLACING CONCRETE

- A. General: Mix, transport, and place concrete in accordance with ACI 301, Chapters 7, 8 and 11; ACI 301, Chapters 6 and 7; and ACI 304, unless otherwise specified.
- B. Hot Weather Concreting: Perform concreting in accordance with ACI 305R and as follows:
1. Concrete placed during hot weather shall have the lowest temperature practicable to produce under the conditions. The temperature of concrete as placed shall not exceed 85 degrees F except where an approved retarder is used. The mixing water and/or aggregates will be cooled, if necessary, to maintain a satisfactory placing temperature.
 2. In no case shall the placing temperature exceed 95 degrees F.
- C. Cold Weather Concreting:
1. Perform concreting in accordance with ACI 306R and as follows:
 2. The ambient temperature of the space adjacent to the concrete placement and surface to receive concrete shall be maintained at not less than 40 degrees F. The

temperature of the concrete when placed shall be not less than 50 degrees F nor more than 75 degrees F. Mixing water or aggregates shall be heated as required to regulate the concrete placing temperature. Materials entering the mixer shall be free from ice, snow, or frozen lumps.

3. Salt, chemicals, or other materials shall not be incorporated in the concrete to prevent freezing.

D. Preparation for Placing Concrete:

1. Conform to ACI 301, ACI 302 and as follows.
2. Polyethylene sheeting shall be laid over dry or previous surfaces to receive concrete as shown on the drawings. Concrete footings and exterior slabs may be laid directly on impervious surfaces which are thoroughly moistened but not muddy at the time of concrete placement.
3. Vapor Barrier for Slabs on Grade: Immediately before placing concrete, the porous fill or subgrade under slabs in buildings shall be covered with a vapor barrier unless membrane waterproofing is indicated. Punctures and tears during subsequent operations shall be patched. Edges shall be lapped not less than four (4) inches and ends not less than six (6) inches. Patches and lapped joints shall be sealed with a pressure-sensitive adhesive or pressure-sensitive tape not less than two (2) inches wide and compatible with the vapor barrier.

4. Rock Foundations:
 - a. The rock surface shall be prepared by roughening, where necessary, and thorough cleaning. Loose rock, dried grout, flaky and scaly coatings, organic deposits, and foreign material shall be removed. Open fissures shall be cleaned to a suitable depth and to firm rock on the sides.
 - b. Cleaning shall be done by use of stiff brooms, picks, jets of water and air applied at high velocity, water blasting or any other effective means, followed by thorough washing. Accumulations of wash water in depressions shall be removed prior to placing the concrete.
 - c. The rock surface shall be completely surface dried by air jets. The presence of any free surface water, which may be indicated by shininess, will not be permitted.
- E. Batching, Mixing and Transporting Equipment: Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C94, except as otherwise specified. Truck mixers, agitators and non-agitating units shall comply with TMMB "Truck Mixer and Agitator Standards". Plant equipment facilities shall conform to NRMCA "Certification of Ready Mixed Concrete Production Facilities".
- F. Pumped Concrete:
 1. Concrete may be conveyed by pumps only when approved by the Owner.
 2. Pumping equipment shall be of a type designed to handle the types, classes, and volumes of concrete to be conveyed without segregation. The pumping distance shall be within the limits recommended by the pump manufacturer. Pipeline shall be steel or flexible hose.
 3. The pump equipment shall be so operated that a continuous stream of concrete without air pockets is produced.
 4. The discharge end of the line shall be positioned as near the final position of the concrete as possible but in no case more than five (5) feet away.
 5. When pumping is completed, the concrete remaining in the pipeline shall be ejected without contaminating the concrete in place. After each operation, the equipment shall be thoroughly cleaned, and the flushing water shall be wasted outside the forms.

3.2

FINISHES

- A. Repair of Surface Defects: Immediately after form removal, repair defects in accordance with ACI 301, Chapter 9.
- B. Formed Surfaces:
 - 1. General: Finish formed surfaces in accordance with ACI 301, Chapter 10 and as specified below.
 - 2. Exposed Interior and Exterior Surfaces: Smooth form finish, ACI 301, Section 10.2.2.
 - 3. Exposed Interior and Exterior Surfaces: Grout cleaned finish, ACI 301, Section 10.3.2.
- C. Slabs:
 - 1. Types of Finish: Conform to ACI 301, Section 11.8.
 - 2. Finishing Tolerances: Conform to ACI 301, Section 11.9.2.
 - 3. Finishing Procedures:
 - a. Conform to ACI 302, Chapters 7, Section 7.1 through 7.2.10, Section 7.8 and Section 7.11.
 - b. Troweling: Provide a second troweling only in areas where slab is to remain exposed.
 - c. Do not use any finishing or troweling machine or other apparatus which has a water attachment for wetting the concrete during finishing.

D. Preparation of Base Slabs:

1. The surface of the structural slab shall be struck off true at the grade indicated on the Contract Drawings or approved as the concrete is being
2. As soon thereafter as the condition of the concrete permits and before it has hardened appreciably (normally within two (2) to four (4) hours after being deposited), all water, scum, laitance and loose aggregate shall be removed from the surface by means of wire or bristle broom in such a manner as to leave the course aggregate slightly exposed and the surface clean. Raking or other methods which cause weak serrations shall not be employed. Avoid "muddying" the surface by brooming too soon. The formation of depressions and general unevenness shall be avoided. Thereafter the Contractor shall take all necessary precautions to ensure that the surface thus prepared is adequately cured and protected from drippings, staining, storage of materials or accumulation of substances which would adversely affect the concrete or the bond between the concrete and the topping.
3. If the surface has hardened to a degree that will not permit adequate cleaning of the surface by brooming, the base slab shall be prepared by chipping, wet sand blasting or scabbling after it has hardened. Such preparation shall thoroughly clean and prepare the surface as specified above. Where chipping or scabbling is required, at least ninety (90) percent of every two (2) square inch area on the surface shall be newly exposed. The depth of chipping or scabbling shall be within the tolerances given above. Particular attention shall be given to all extremities of placement, such as at columns, openings, walls, construction joints, etc. In these locations 100 percent of new concrete shall be exposed for a band at least four (4) inches wide.

3.3

CURING AND PROTECTION

- A. Cure and protect concrete in accordance with ACI 301, Chapter 12, ACI 302, Chapter 8 and ACI 308.
- B. Provide appropriate measures for the prevention of plastic shrinkage cracking in accordance with ACI 302, Section 8.4.

C. Curing Compound:

1. Do not use curing compound on surfaces to receive cementitious setting beds or toppings; terrazzo; paint; insulation, roofing or waterproofing; resilient tile; carpeting; thin-set ceramic tile or on any other surfaces that are to receive any subsequent treatment depending on adhesion or bonding to the concrete.
2. Concrete surfaces which have been subjected to rainfall within three (3) hours after during compound has been applied shall be resprayed at the coverage herein specified.

D. Correction of Defective Appearance:

1. If the use of any curing method results in stained, discolored, streaked or blotchy appearance, the use of that method shall be stopped, and another acceptable curing method shall be substituted until the cause of the defective appearance is corrected.
2. All such defective surfaces shall be remedied to the satisfaction of the Owner.

3.4

MISCELLANEOUS CONCRETE WORK

A. Filling-in: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown, after work of other trades is in place. Mix, place, and cure concrete as herein specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work including wheel guards, pipe stanchions and similar items.

B. Installation of Grouts:

1. Base plates, bearing plates and similar items of structural steel shall be grouted immediately after their erection.
2. Plates shall be set and anchored to the proper lines and elevation. Concrete and metal surfaces in contact with grout shall be clean and free of laitance and shall be dampened.
3. Conform to the manufacturer's recommendations for mixing, placing, and curing of grout. Use chains, rods or vibrator to compact grout and remove voids.

C. Installation of Concrete Floor Fill:

1. Any equipment shall be accurately adjusted by a representative of the manufacturer prior to placement of the concrete fill, trowel-grade mortar.
2. Just prior to placement of the concrete fill, all debris and loose and foreign material shall be removed from the base slab. The base shall then be cleaned by brooming and/or air jet and flushing with a strong jet of water.
Care shall be taken to clean thoroughly every square inch of the base, including all depressions, so that it will be in the same clean condition as specified above for preliminary preparation.
3. The base slab shall be left thoroughly wet at least twelve (12) hours to absorb water and thus prevent ultimate flash hardening and provide a source of water for curing of floor fill.
4. Immediately before the fill is placed, all pools of water left on the base by cleaning or prewetting operations shall be removed by air jet and a premixed thin (1/16 inch to 1/8 inch thick) coat of thick neat-cement paste or slurry having the consistency of thick lead paint shall be broomed and scrubbed into the still damp (but not glistening wet) surface for a short distance ahead of the placing operations. The area slurried at one time should not be over 100 square feet so that the paste will not achieve its initial set before the finish is placed. Dusting dry cement will not be permitted.
5. Apply and broom in the slurry in small areas not exceeding five (5) feet square to avoid segregation and dilution of the paste. All extremities of placements such as at walls, openings, construction joints, etc. shall be given special attention. Excess, diluted and dead slurry shall be constantly removed from the base.

3.05 REPAIR OF DAMAGED WORK

- A. Before final acceptance of work, neatly repair damaged surfaces, corners of concrete and concrete finish whether such damage resulted from action of elements or from any cause whatsoever.
- B. Finish damaged concrete where surface repairs are permitted to a smooth, dense, watertight condition.

3.06 CORRECTIVE WORK

- A. If the Owner gives permission for defects to be corrected, remove defective concrete, then roughen, key and soak surface with water before patching with concrete or mortar of color to match surrounding concrete. White cement shall be added as required material to produce same color as original concrete.
- B. Prepare mortar used in pointing not more than thirty (30) minutes prior to use.
- C. Correct high areas in slab surface by grinding, after concrete has cured at least fourteen days

3.7

FIELD QUALITY CONTROL

- A. Testing and Inspection Services:
1. During the entire period when concrete is being placed, testing and inspection services shall be provided by an independent testing laboratory retained and paid for by the Owner.
 2. The Contractor, however, shall supply whatever assistance, including labor and equipment that the test service may require. This shall include obtaining sample and the filling of cylinders.
- B. Reports: The laboratory shall prepare and submit all reports required in the various standards and specifications referenced herein to the Owner and the Contractor.
- C. Scope of Testing and Inspection Services: The laboratory shall provide testing and inspection services in accordance with the below-referenced section of ACI 301 and in accordance with the Building Code.
1. Strength Tests: Conform to ACI 301, Section 16.3.4 except as follows:
 - a. Make one strength test (four (4) cylinders) for each thirty (30) cubic yards or fraction therefore each mix design of concrete placed in any one day.
 - b. Test one (1) specimen at seven (7) calendar days and three (3) specimens at twenty-eight (28) calendar days.
 - c. The twenty-eight (28) calendar day test results shall be the average of the strengths of the three (3) specimens, except that if one (1) specimen in a test manifests evidence of improper sampling, molding, or testing, it shall be discarded, and the remaining two (2) strengths averaged.
 - d. Should more than one (1) specimen in a test show any of the above defects, the entire test shall be discarded.
 - e. Whenever the seven (7) calendar days test results are below sixty-five (65%) percent of the specified strength and/or whenever the twenty-eight (28) calendar days test results are below the specified strength, the specimens shall be stored and kept intact for thirty (30) days or until inspected by both the Owner and the Contractor, which-ever is sooner.
 2. Slump, Air Content, Unit Weight and Temperature: Conform to ACI 301, Sections 16.3.5, 16.3.6, 16.3.7 and 16.3.8.
- D. In-place Tests:
1. Additional tests shall be performed by the laboratory if twenty-eight (28) calendar days test cylinders show strengths less than that which is required. The cost of these additional tests shall be borne by the Contractor and may include core tests and load tests and the use of mechanical, electrical, and electronic testing devices.
 2. Additional testing may also be required if there is evidence of faulty workmanship or a violation of project requirements. The cost of these tests shall be borne by the Contractor.
 3. In the event of placed concrete failing the cylinder tests or any additional tests as above, the entire concrete shall be replaced, and all the costs shall be borne by the Contractor.

3.8

SCHEDULE - CONCRETE CLASS USE

- A. Class A - 4,000 psi 28 calendar days air-entrained concrete for all foundation slabs, walls, abutments, footings, piers, steps, pile caps, manholes and all structural concrete for superstructures.

END OF SECTION

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Portico framing
 - 2. Wood blocking, and nailers.

1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. WCLIB: West Coast Lumber Inspection Bureau.
 - 2. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.

4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Sustainable Design Submittals:

1. Certificates: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.
2. Laboratory Test Reports: For adhesives and plywood, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Powder-actuated fasteners.
5. Metal framing anchors.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Certified Wood: Lumber shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Provide dressed lumber, S4S, unless otherwise indicated.
- C. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC3b for exterior construction not in contact with the ground
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

2.3 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.

2. Nailers.
 3. Rooftop equipment bases and support curbs.
 4. Cants.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber and any of the following species:
1. Hem-fir; WCLIB or WWPA.
 2. Western woods; WCLIB or WWPA.
- C. For concealed boards, provide lumber with 15 percent maximum moisture content and the following species and grades:
1. Hem-fir Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
 2. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.
- D. For blocking and nailers used for attachment of other construction, select, and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NESNER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for

accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Do not splice structural members between supports unless otherwise indicated.
- D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.
- E. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- F. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- G. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NESNER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- H. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 ROOF RELATED CARPENTRY

- A. Extend roof curbs as required to maintain minimum curb height required as indicated on drawings. Contractor to coordinate roofing slope heights and finished curbs to assure 8 inch minimum clear to maintain roof warranty.

3.4 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 53

061100 Fiberglass Columns

1.1 General

1.2 Description:

- A. Columns shall be Royal Corinthian, Inc. Royalite fiberglass column covers or equal.
- B. Column Style: Plain,

1.3 Submittals

- A. Submit Royal Corinthian, Inc. literature and shop drawings if required.
- B. Submit sample if required (specific sized samples may not be available).
- C. Submit sample for color match if custom color is required.
 - 1. Standard color is marine grade white gel coat which is considered paint-grade.
 - 2. Many standard colors are available in addition to the standard white.
 - 3. Custom colors require a sample to be submitted for color matching.
 - 4. Standard texture is smooth but custom textures are available.

1.4 Warranty

- A. The column covers shall be guaranteed in writing against defects of materials or workmanship for a period of 25 years to the original owner.
- B. Columns must be installed following Royal Corinthian, Inc. guidelines.

1.5 Verification of Design

- A. The components incorporated into the drawings show dimensions and styles chosen to accomplish the Architect's intended aesthetic result and to conform to the building's configuration in both form and function. The contractor shall verify that all components to be provided by Royal Corinthian for the work of this section will fit the building's structural elements and meet the visual design criteria on the drawings without materially altering profiles and alignments.
- B. Any additional support or backing components shall be provided by the installing contractor as part of the work of this section.

2.1 Products

2.2 Acceptable Manufacturer

- A. Royal Corinthian, Inc. 603 Fenton Lane West Chicago, IL 60185T. 888-265-8661 royalcor@royalcorinthian.com www.royalcorinthian.com
- B. Substitutions: Provide shop drawings.

a. Fiberglass, Resin, and Gel Coat Materials

- i. Fiberglass chop strand or mat shall be equal to the products of PPG-Owens Corning.
- ii. Polyester resins shall be General Purpose or Class A. The Class A resin will be flame retardant polyester resin. This resin is formulated for use in applications that require an ASTM E 84-01 Class 1 flame spread and smoke suppression rating, without the use of fillers.
- iii. Gel coat shall be high performance Marine Grade with ultra-violet inhibitors.

- iv. Column thickness shall be a minimum of 3/16".
 - D. Gel coat thickness shall be 0.015" minimum to 0.025" maximum.
 - E. Allowable Tolerances
 - 1. Dimensional Tolerances of Finished Units
 - a. Dimensions 12' or under: +/- 1/4".
 - F. Column diameters and widths are nominal

3.1 Execution

3.2 Delivery

- A. Deliver materials in original packages, containers, or bundles bearing brand name & identification of manufacturer or supplier. Customer to unload and store materials onsite under cover and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, corrosion, and damage from construction traffic and other causes.
- B. Handle materials and products to prevent damages to edges, ends, or surfaces

3.3 Installation

- A. Follow manufacturers detailed installation guidelines. They are available online or by request.
- B. Recommend Caulk for all joints is a high-end construction adhesive that is paintable.
- C. Paint-grade columns are recommended to be sanded at seam once finished, primed, and painted.

SECTION 073126 SLATE SHINGLES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions, and Division 0 and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Provide all labor, equipment, materials and services required to perform the work of this Section as indicated on the Drawings and specified herein.
- B. This Section includes, but is not limited to, the following:
 - 1. Removal of existing slate shingles and installation of new slate shingles.
 - 2. Installation of new underlayments.
 - 3. Such other Work as specified herein or shown in the Drawings.
- C. Related Sections:
 - 1. Section 061053 – Miscellaneous Rough Carpentry
 - 2. Section 076200 – Sheet Metal Flashing and Trim

1.3 REFERENCES AND STANDARDS

- A. Comply with applicable requirements of the most recent editions of the following standards and others referenced in this Section. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. National Slate Association – *Slate Roofs: Design and Installation Manual*, 2010 Edition.
 - 2. ASTM C406 – Standard Specification for Roofing Slate.
 - 3. ASTM D226 – Standard Specification for Asphalt-Saturated Organic Felt Used in roofing and waterproofing.

4. ASTM D4869 – Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing.
5. ASTM D1970 – Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
6. ASTM E108 / UL 790 - Standard Test Methods for Fire Tests of Roof Coverings. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
7. ASTM D3161 – Standard Test Method for Wind-Resistance of Steep Slope Roofing Products.
8. FM Approvals 4473 Impact Resistance Testing of Rigid Roofing Materials by Impacting with Freezer Ice Balls.
9. FM Approvals 4475, Class 1 Steep Slope Roof Covers, Section 4.1.1 – Approved Wind Speed Categories for Roof Covers.

1.4 SUBMITTALS

- A. Submittals shall be made in accordance with Section 013300.
- B. Product Data
 1. Underlayment(s) and underlayment fasteners. Product data for the roof underlayment must include the ASTM Standard to which it complies.
 2. Slate shingles and slating nails.
 3. ASTM C406 test results for specified slate (including ASTM C120, *Flexure Testing of Slate* (Breaking Load), ASTM C121, *Water Absorption of Slate*, and ASTM C217, *Weather Resistance of Slate*).
 - a. Testing must be conducted in accordance with the most recent version of these standards.
 - b. Test results must be less than 2-years old and be conducted on slate from the quarry from which the slate is to be obtained.
 - c. Testing shall be conducted by and reported on the letterhead of an NSA approved testing laboratory – see NSA’s website, www.slateassociation.org for approved labs.
 4. Provide Letter of Confirmation from the quarry/distributor certifying that slate being provided was produced in the region specified in Part 2 of this

Section.

C. Samples

1. Three slate shingles of each color, showing the full, natural range of color variation to be expected in the finished work. Contractor shall match existing slate shingles as closely as possible
2. Slating nails.

D. Shop drawings

1.5 QUALITY ASSURANCE

- A. Work of this Section shall comply with applicable standards indicated or implied.
- B. Provide products in each color from a single quarry during the course of the Work for consistency of quality and appearance.
- D. Slate roofing contractor shall have at least 10-years experience in the installation of new slate roofing/repair of existing slate roofing and shall have successfully completed at least three slate roofing projects within the past five years similar in scope and scale to the Project specified herein. Foreman or superintendent shall have similar experience and shall provide full-time supervision of installers.

1.6 TEST PANELS

- A. Prepare the following slate roofing test panels in an area and size designated by the Architect, or as indicated below, to verify selections made under sample submittals and to demonstrate aesthetic effects and quality standards of materials and execution.
 1. Installation of slate shingles at roof eave (starter, first, second, and third course), including underlayments, drip edge metal, and cant for slate, 5 linear feet.
 2. Installation of slate shingles at open valley, 3 to 4 courses at 1 valley.
 3. Slate shingle roofing, 100 square feet.
 - a. This test panels shall be completed only after the test panels listed above are reviewed and approved by the Design Professional.

4. Hip slates with copper hip-cap, 3 to 4 linear feet of hip.
 5. Ridge slates with copper ridge-roll, 3 to 4 linear feet of ridge.
- B. Modify test panels as required to produce acceptable work in compliance with this specification and meeting the approval of Design Professional.
 - C. Do not proceed with remaining work until test panels are approved, in writing, by the Design Professional.
 1. Approved test panels shall be left in place and incorporated into the final construction.
 - D. Approval of test panels does not constitute approval of deviations from the Contract Documents contained in the panels, unless such deviations are specifically approved, in writing, by the Design Professional.
 - E. Coordinate test panels specified herein with each other and with those specified in other sections as required.
 - F. Group test panels to the maximum extent possible such that Architect may review multiple test panels from this and other specification sections in the course of a single site visit.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Ensure the availability of adequate off-loading equipment and manpower at the job site for the mode of delivery used, and storage space for the quantity of slate shingles to be received.
- B. Deliver slate shingles to project site in pallets with each labelled with the source, size, quantity and color contained in each pallet.
- C. Slate shingles shall be packaged on edge and separated by wood lath or other rigid material if rows are stacked vertically in the pallet.
- D. During extended periods of storage on site, tarp or otherwise cover the pallets to keep the shingles clean and prevent them from freezing together during cold weather. Store pallets at site on a solid, level surface and handle shingles to prevent chipping breakage, soiling or other damage.
- E. Load slate shingles on the building in a manner to avoid damage to the roof deck, structural supporting members, staging and scaffolding.

- F. Store accessory materials including nails, slate hooks, underlayment, and ice dam protection membrane according to the manufacturer's recommended storage instructions.

1.8 PROJECT/SITE CONDITIONS

- A. Prior to beginning work, Contractor shall secure approval from the Owner for the following:
 - 1. Areas permitted for personnel parking.
 - 2. Access to the site and hours for construction activity.
 - 3. Areas permitted for storage of materials and debris.
 - 4. Areas permitted for the location of cranes, hoists, and chutes for loading and unloading materials to and from the roof.
- B. Interior stairs or elevators may not be used for removing debris or delivering materials to the roof or ground.
- C. Contractor employee access shall not be permitted to the interior of the building. Building access approval shall be obtained from the Owner.
- D. Exterior sanitary facilities are required and shall be provided by the Contractor.
- E. An exterior water source and electricity shall be provided by the Owner.
- F. The buildings shall remain occupied during construction. During the full course of the Work, the Contractor shall ensure that all pedestrian access points, including all entrances, foot paths, sidewalks, emergency means of egress, and vehicle access routes, shall be protected and display clear signage where barricades and construction fencing are employed. Do not block fire exits or impede ADA access.
- G. If discrepancies are discovered between the existing conditions and those noted on the Drawings, immediately notify the Architect in writing and obtain written approval prior to commencing the Work. All necessary steps shall be taken to make the building watertight until the discrepancies are resolved.
- H. Proceed with the Work as weather conditions permit and/or as required by manufacturer's installation instructions or warranty requirements.
- I. Proceed with slate shingle roofing installation only after substrate construction, vent stacks, and other roof penetrations are complete, when substrate materials are dry, and weather conditions are appropriate.

- J. The Contractor shall ensure that work areas as well as the entire building are completely protected from water infiltration and remain watertight throughout the course of the project and water does not flow beneath any completed sections of the slate roof system. The Contractor shall be responsible for all slate breakage on the project, prior to project closeout. After project closeout, the slate repair responsibilities of the Contractor shall be as set forth in the project contract and warranty documents.
- K. All exterior means of access required to perform the Work on the subject building as described in the project documents, shall be the responsibility of the roofing contractor. All access shall fully comply with all local, state, and OSHA safety codes and requirements.

1.9 SEQUENCING/SCHEDULING

- A. Schedule and execute work to prevent leaks and excessive traffic on completed roof sections. Coordinate work of this Section with interfacing, adjoining, and related roofing work for proper sequencing of each installation.
- B. Do not disrupt activities in occupied spaces.
- C. When multiple trades are accessing the same work area, coordinate the work sequence so as not to hinder the project schedule or detract from the quality of the work.
- D. The Owner shall reserve the right to close the jobsite to construction activities if those activities conflict with building schedules. The Owner shall provide as much notice as possible for any work disruptions.

1.10 WARRANTY

- A. **Slate Shingle Supplier Warranty:** Submit slate shingle supplier warranty, signed by the supplier and covering the slate shingles described in this Section, in which the supplier agrees to replace slate shingles that fail in materials and deliver the replacement slate to the original point of destination. The duration of this warranty shall be 75 years from date of original supply.

- B. Roofing Installer Warranty: Submit roofing installer warranty, signed by roofing installer and covering Work of this Section, in which the roofing installer agrees to repair or replace slate roofing that fails in materials or workmanship within the following warranty period.

1. Warranty Period: Five years from date of substantial completion

- C. Additional Roofing Installer Warranty: The roofing installer agrees to return to the job site one year from the date of substantial completion of the to replace any broken or missing slates created as a result of normal, installation-related, shedding.

1.11 EXTRA MATERIAL

- A. Provide an additional one square of field slates, twenty pieces of starter slate, and thirty pieces of hip and ridge slates for Owner's use in future roof maintenance.
 - B. Place extra material in storage in a location designated by the owner.
- PART 2 –
PRODUCTS

2.1 SLATE SHINGLES

- A. Standard: New slate shall comply with ASTM C406, *Standard Specification for Roofing Slate*, Grade S-1; hard, dense, and sound natural stone, with chamfered edges. No broken or cracked slates will be accepted and no broken exposed corners exceeding 1" will be allowed. Broken covered corners shall not prevent the laying of a weathertight roof and the slate shall not be installed when either the base or leg of the right triangle broken off exceeds 1-1/2".

1. Acceptable suppliers include those shown on the current list of National Slate Association member quarries and distributors at www.slateassociation.org or alternate submitted and approved by the Architect.

- B. Source and Color of Slate:

- 1. Vermont & New York
 - a. Semi-Weathering Gray/Green (Sea Green) – 40%
 - b. Semi-Weathering Purple (Royal Purple) – 20%
 - c. Unfading Gray/Green – 40%

- C. Shape of slate: (p.11)

- 1. Rectangle

D. Size:

1. Length
 - a. Single length 18"
2. Width:
 - a. Random widths from 9" to 12"
 - b. Wider slates as needed for approach slates and slates adjacent to valleys, hips, vertical walls, rakes, etc. Wider slates shall measure 14" in width.
3. Thickness:
 - a. Single thickness: nominal 1/4"
4. Starter slates: 20" L x 11" W x 1/4" Thick

E. Nail Holes:

1. Punch or drill two nail holes in each slate, located one-quarter to one-third down the slate length, measured from the head of the slate, and 1¼" to 1½" in from each side edge. Nail holes shall be located on the thinner end of the slate.
2. Hip, ridge, and approach slates may be supplied unpunched. These slates shall be punched or drilled on site.
3. Starter slates may be supplied punched or unpunched. If supplied unpunched, these slates shall be punched or drilled on site.

2.2 SLATING NAILS

A. Slating Nails shall be sharp-pointed with a 3/8-inch diameter flat head.

1. Material: Solid copper.
2. Thickness/Shank Diameter: 10-gauge (.134")
3. Length: 1-3/4" long
4. Shank: Smooth

2.3 UNDERLAYMENTS

- A. Fiberglass reinforced SBS base sheet meeting the requirements of ASTM D6163, Type I, Grade S, or equal.
 - 1. Products
 - a. "Boral Ply 40" by Boral.
 - b. "Right Start UDL" by Malarkey
 - c. "Dynabase" by Johns Manville, or approved equal.
 - 2. Underlayment Accessories
 - a. Corrosion resistant, large head fasteners (or plastic cap nails) of sufficient length to prevent blow-off, or as recommended by underlayment manufacturer.
- B. Ice Dam Protection Membrane Self-Adhering Underlayment, polyethylene faced for ice dam protection at eaves and where shown in the Detail Drawings: ASTM D 1970, minimum of 30 mils thick; slip-resistant, polyethylene-film or granule surfaced laminated to SBS-modified asphalt adhesive, with release-sheet backing; cold applied.
 - 1. Products
 - a. "Grace Ice & Water Shield HT," GCP Applied Technologies, Inc., Cambridge, MA 02140, (617) 876-1400 or (877) 423-6491
 - b. "WeatherLock G," Owens Corning, Toledo, OH 43659, (800) 438-7465
 - c. approved equal

2.4 ACCESSORIES

- A. Slate hooks for slate repair work: For slates with a 3" headlap and measuring up to 3/8" thick, 3" long, solid copper, Type 304 stainless steel, or Type 304 stainless steel powder coated black or bronze.
- B. Nail head covers (bibs) for slate repair work: 16 oz. or 20 oz. copper, Grade HOO (cold rolled), complying with ASTM B370, or lead coated copper complying with ASTM B101, Type 1, Class A. Bibs shall measure 3" to 4" wide by 8" long. Snip bibs along their long sides to form barbs and/or bend to a slightly concave or S-shape prior to insertion to help prevent the bibs from sliding out.
- C. Cants for starter course of slate shingles: Wood cants, standard 3/16"-1/4" thick plaster lath, tapered horse feather shims, or ripped rot-resistant lumber. Fabricate to height and width required to permit first and subsequent courses of slate to lie flat atop underlying courses.

1. Where shown in the Detail Drawings, brake inverted V-shaped cants directly into metal drip edge flashings and gutter liners located at the roof eaves. Fabricate cant to height required to permit first and subsequent courses of slate to lie flat atop underlying courses.
- D. Wire used for hanging slates to avoid nailing thru underlying flashings: 99.99% pure copper wire conforming to ASTM B3, 0.051" diameter, minimum.
- E. Sealant adhesive for use as adhesive dabs below hip and ridge slates: Exterior, non-sag, gun grade, single-component, sealant adhesive complying with ASTM C 920, Type S, Grade NS, Class 12.5, use group NT, I, M, and O, or Design Professional approved alternate sealant adhesive. Color shall be manufacturer's standard color matching that of the slate as closely as possible.
- F. Wood Nailers: See Section 061053.

2.5 FLASHING MATERIALS

- A. See Section 076200 for flashings, gutters, and leaders (downspouts).

2.6 LIGHTNING PROTECTION MATERIALS

- A. See Section 264113 for materials and fasteners to be used for securing lightning protection conductor cables and air terminals to slate shingle roofs.

2.7 SLATER'S TOOLS

- A. The following traditional slating tools shall be used for installation of the slate shingles:
1. Slate hammer for punching and nailing slate shingles.
 2. Ripper for removing slate shingles.
 3. Slate cutter or a slater's stake and slate hammer for trimming and cutting slate shingles.
 4. Steel punch for forming holes in delicate or small pieces of slate.
- B. Slates trimmed or cut on site shall have a bevel-edge similar to that produced at the quarry. Note that a grinder or saw shall not be used for cutting/trimming field slates as they will not produce a beveled edge similar to that produced at the quarry.
- C. The use of nail guns for installing slate shingles shall not be permitted.

PART 3 – EXECUTION

3.1 GENERAL

- A. Examine the roof deck and verify that it is satisfactory condition and ready to receive the new roof underlayment and slate shingle system.
 - 1. Verify that the roof deck is well secured to the roof framing, free of warping or cupping, free of projecting fasteners, and the edges between boards are flush.
 - 2. Verify that the roof deck is clean, dry, and free of dew, frost, or other contaminants that might interfere with the laying or long-term durability of the slate roof system.
 - 3. Report deficiencies in the roof deck to the Design Professional prior to commencing work.
- B. Slating shall begin at the roof eave and progress toward the ridge/top of the roof slope.
- C. Sorting: Sort slate shingles for thickness prior to installation on the roof. Sort shingles by hand into three thicknesses as follows:
 - 1. Thin: For use in slate courses closest to the ridge.
 - 2. Thicker: For use in slate courses in “middle” courses.
 - 3. Thickest: For use in the slate courses closest to the eave.
 - a. The goal is to create a roof of smooth, uniform appearance. Slate of different thicknesses shall not be used adjacent to each other.
 - b. Transitions between the different thicknesses of slate shall occur at hips, ridges, vertical walls, and other non-conspicuous locations, and not in the field of the roof.
- D. Blending: To help account for the natural variation in the coloration of the slate shingles, blend slates from several different pallets as it is brought to the roof surface to help provide for a more uniform overall appearance.
 - 1. Blending may occur prior to, or in association with sorting.
- E. Culling: No broken or cracked slate shall be used. Sound each slate for defects by tapping with a slate hammer or other metal object as it is being installed. Reject and dispose of all slates that do not emit a sharp, clear ring when tapped, or set aside for potential review by Supplier.

1. Cull and discard, or set aside for potential review by Supplier, warped and cupped slate shingles, those that are out of square, those with knots, knurls, or cramps on their unexposed faces, and slates with visible inclusions of iron pyrite.
 2. Cull slates that are unusually thin or thick; i.e., in a roof where a smooth, planar appearance is desired, slates that will be subject to breakage, cause shadow lines, or cause the butt ends of overlying slates to stick up, as well as those with curvature or twist greater than 1/8" in 12" across the width of the slate.
- F. Nail holes made on site in slates shall be punched or drilled from the back of the slate to produce a small recess, or countersink, on the exposed face of the slate to accept the nail head.
1. Drill nail holes in slates where a nail used to secure a clip, cleat, or lock strip associated with a flashing must pass through an underlying slate. Similarly, drill nail holes in slates that taper to a point or have a small nailing area, such as hip slates.
- G. Slates cut on site shall be cut from the back of the slate to maintain a beveled edge on the exposed face.
- H. Slate Order: As work progresses, check that the quantity of slate remaining on site is sufficient to complete the Project. Order additional quantities of slate in a timely manner, as required, so as not to delay final completion of the project and to allow proper blending of the slate.

3.2 REMOVAL OF EXISTING SLATE SHINGLES

A. Slate Roof Replacement - Disposal

1. Remove all slate shingles and associated underlayments down to the roof deck.
 - a. Pull/remove (do not drive-in) all slating nails and fasteners associated with existing underlayments.
 - b. Deck irregularities: Identify broken, warped, cracked, rotted, or otherwise deteriorated or irregular roof decking and framing that would make the substrate unsuitable as a substrate for new underlayments and new slate roofing, and report to the Design Professional.
 - c. During the course of the Work, protect from damage all roofing, flashings, rainwater conduction systems, and other building and site elements scheduled to remain. Protect interior finishes and contents from moisture damage during the course of the Work.

- d. Lower demolition debris to grade using enclosed chutes or other means. Plan method of removal from elevated heights. Remove in a controlled manner. Do not throw demolition debris off of the roof.
- e. Clean work area and surrounding areas at grade to remove all slate chips, roofing nails, and other debris on a daily basis and at the end of project. The site shall be left clean.
- f. Remove no more slate than can be reinstalled or made weathertight by the end of the day.

3.3 UNDERLAYMENT INSTALLATION

- A. Verify that the roof deck is ready to accept the roof underlayment. Notify Design Professional in writing of any unsuitable conditions, such as voids, damage, or unsupported areas.
 - 1. Mechanical fasteners used to secure the roof decking shall be set flush with the surface of the decking and fastened into solid blocking or framing members.
 - 2. All surfaces shall be clean, dry, and free of oil, grease, dirt, frost, dew, and other contaminants that could cause damage to the roof underlayment.
 - 3. Decking shall be smooth, planar, continuous, and have adjacent edges set flush.
- B. Ice Dam Protection Membrane: Install ice dam protection membrane 6-feet wide at eaves.
 - 1. Install ice dam protection membrane full length of valleys and in crickets as shown in the Detail Drawings, lapping bottom end on top of ice dam protection membrane installed at the roof eave.
 - 2. Install ice dam protection membrane stripping along the top edge of metal gutter liners and crickets as shown in the Detail Drawings.
 - 3. At vertical walls, dormer cheek walls, party walls, chimneys, etc., extend ice dam protection membrane up the vertical surface 4 inches, minimum, or as shown in the Detail Drawings.
 - a. See Paragraph C., below, for flashing of pipe penetrations.

4. Prior to installation of ice dam protection membrane, vacuum roof deck to remove all dust and debris. Install ice dam protection membrane directly to the roof deck in accordance with membrane manufacturer's instructions. Lap sides 3-1/2", minimum, in direction to shed water. Lap ends 6" minimum. Roll all laps with roller.
 - a. Prime roof deck as recommended by the ice dam protection membrane manufacturer if good adhesion is not obtained and when temperatures fall below 50 degrees Fahrenheit.
- C. Cover ice dam protection membrane with roof underlayment as outlined below.
- Underlayment
1. Install single layer of specified underlayment in horizontal courses in shingle fashion to shed water, beginning at eave line and covering entire roof area. Install each course such that it laps the previous course 2". Lap ends 6", minimum. Stagger end laps of adjacent courses a minimum of 6 feet. Secure along laps, ends, and in field of felt with specified fasteners as necessary to properly hold the felt in place and protect the building from water infiltration until covered with slate shingles. Fasteners placed along laps shall be spaced at no more than 36" on center.
 2. Underlayment shall lap hips and ridges 12" to form double thickness.
 3. At vertical walls, extend felt underlayment up the vertical surface 4" minimum, unless otherwise shown in the Detail Drawings.
 4. Flash penetrations through the roof using specified ice dam protection membrane to provide for a secure and watertight assembly. Ensure ice dam protection membrane target flashing is large enough to permit top edge of metal flashing to be installed to be striping-in with ice dam protection membrane (i.e., stripping to be centered on top edge of metal flashing and be installed directly to the metal flashing and directly to previously installed ice dam protection membrane).
 5. At roof eaves, the underlayment shall lap on top of the metal drip edge. At rakes, underlayment shall be covered by the metal drip edge.
 6. Cover roof underlayment with slate shingles as soon as possible. Remove and replace underlayment that has become wrinkled or damaged, or has been exposed on the roof for more than 60 days.

3.4 SLATE INSTALLATION

A. Protection of Roof Surfaces

1. The roof is to be properly staged to allow safe work surfaces, such as brackets and planks, that prevent unnecessary foot traffic on the slates.
2. Where foot traffic is unavoidable, roof ladders, hook ladders, chicken ladders, foam pads, or other such devices shall be used to protect the slates.
3. Workers are to avoid walking on the slate surfaces during, and after, installation.

B. Laying Out the Roof

1. Check that the eave is straight and level, the ridge is parallel to the eave,
2. Snap a line for locating the starter course equal to the vertical dimension of the starter slate minus the specified overhang (1½"). Set the starter course parallel to the eave. If the eave is not straight, make small adjustments in successive courses until the course lines are straight and parallel.
3. Chalk the line for the first course by measuring up from the eave the length of the slate, minus the specified overhang.
4. Chalk the line for the last full course at the ridge (finishing course), making sure it has an exposure of 7-1/2". Adjust the exposure of the courses approaching the ridge in small increments to obtain the required exposure of the finishing course (see subparagraph 5).
5. Snap horizontal lines based on the exposure of the slate, making small adjustments as needed so the courses end up parallel to the ridge and the exposure remains within ¼" of adjacent courses. When within 5 to 10 feet of top of slope, re-measure, and adjust the exposure in the remaining courses in small increments (1/8" to 1/4" per course) as needed for proper coursing. Do not reduce the headlap; always decrease the exposure so as to increase the headlap. (This same procedure applies to the laying out of courses at bottom and top of dormers to assure that the courses line up

6. If the eave and/or ridge are not horizontal, establish a level line as a reference for snapping the course lines. Slate courses shall run horizontally. Treatment of special conditions shall be incorporated in the Test Panels under Paragraph 1.6, above.

C. Eave

1. The starter course of slates shall be laid horizontally (with the long edge perpendicular to the roof slope) with the bevel-edged side facing down, and be canted to allow the starter slates to be tilted to the same angle as the field slates.
2. The starter slates shall have nail-holes 1" to 1½" down from the top, long edge of the slate, and approximately 1½" in from each short edge.
3. Eave slates shall be laid to provide the specified overhang (1½"), or as shown in detail drawings) beyond the furthest extent of the fascia, cornice, crown molding, metal drip edge, trim, or other construction material at the eaves.
4. Slates at the eaves shall be doubled by first installing a slate starter course. The first course of slate shall be laid over the starter course so that the butt edges of both courses align. The first course of slate shall break side joints with the starter course side joints by not less than 3". The second course of slates must overlap the starter course by at least the headlap of the field slates along the eaves.

D. Field Slates

1. Exposure and Headlap
 - a. All standard field slates shall be installed with a minimum 3" headlap.
2. Offset: Slate side joints shall be positioned as near the mid-point of the underlying slates as possible, and not less than 3" from the underlying joints.
3. Joint Spacing: Slates shall be laid nearly touching side-to-side, or with a gap of approximately 1/8" between slates). Small adjustments can be made in joint spacing and/or slate width as needed when approaching rakes or walls to avoid use of excessively narrow slates; no slate shall measure less than 6" in width.

4. Fastening – Nailing and Wiring
 - a. Secure each slate to the roof deck with two nails set in holes pre-punched or drilled at the quarry, or punched by hand on site.
 - b. Set each nail with the head set in the countersink left by the punching of the nail hole; nails must not be over-driven, nor under-driven; nail heads shall touch the slate lightly, without producing strain on the slate and such that the slates hang from the nails.
 - d. Slates located adjacent to flashings shall be nailed to avoid puncturing the flashing material. Move one or both of the nails up, or closer to the center of the slate; secure the slate with a second nail placed one above the other on one side of the slate; or, secure the slate with copper wire fastened to the roof deck upslope of the top edge of the flashing.
5. Shapes: The slate shape shall be rectangular.

F. Valleys

1. Valleys shall be open
 - a. Open Valleys
 - i. Slates at the edges of valleys shall be cut in neat and straight lines.
 - ii. Valley slates are to be cut from the back of the slate to maintain a beveled slate edge.
 - iii. Clip the upper corner of valley slates to allow the slate to lay correctly and to direct moisture toward the valley centerline.
 - iv. For fabrication of valley flashing, see section 076200.
 - v. Lay slate a minimum of 3"-4" each side of the valley centerline. Taper outward 1/16" per foot from top to bottom to allow for release of ice.
 - vi. When fastening slates, do not puncture valley flashing with nails. Use wider slates as needed; place two nails, one above the other along the edge of the slate farthest from the valley centerline; or, hang slates from copper wire secured above the top edge of the valley flashing.
 - vii. Adjust width of slates approaching a valley to avoid the need to cut slate to a point at the valley; width of the butt of the valley slate shall be 3" minimum.

G. Penetrations

H.

1. Slate shall be neatly fitted around pipes, ventilators, and other roof penetrations.
 - a. Do not nail through flashings.
 - b. Trim slates neatly.
 - c. See Section 076200 for flashings.

I. Flashings

1. Integrate flashings as slates are being installed.
 - a. See section 076200, Sheet Metal Flashing and Trim.
 - b. Flashing shall be installed where there are roof plane intersections, where the roof abuts walls, parapets, dormers and chimneys, at roof penetrations, and where shown on the Drawings.

J. Slate Repair

1. Where individual slates that must be installed in the field of the roof after the installation is complete, such as where a roof bracket has been removed or where a broken slate must be removed and replaced, such installation shall be made in accordance with the slate repair procedures specified in Paragraph 3.7, below.

- K. Coordinate slate installation with the installation of snow retention devices specified in Section 077253.

3.5 RIDGE SLATES

- A. Install ridge slates (finishing course slates) in coordination with installation of new copper ridge flashings (see Section 076200) and associated wood blocking.

3.6 Ensure roof underlayment is whole and overlaps the ridge a minimum of 12" in each direction. HIP SLATES

- A. Install hip slates in coordination with installation of new copper hip flashings (see Section 076200) and associated wood blocking.

1. Ensure roof underlayment is whole and overlaps the hip a minimum of 12" in each direction.

3.7 SLATE SHINGLE REPAIR

- A. Replacement slates shall match the existing.
- C. Remove existing broken slates and associated slating nails using a slate ripper. If the head of a slate cannot be removed in this manner, carefully remove adjacent slates as required to remove fragments and clear space for the replacement slate.

D. Replacement slates shall be fastened using one of the following methods:

1. Nail-and-Bib Method:

- a. Slide replacement slate into position.
- b. Punch or drill a nail-hole through the replacement slate approximately 3/4" to 1" below the butt of the slate two courses above, in the bond line between the slates in the course immediately above.
- c. Fasten the slate with a single copper slating nail.
- d. Insert a copper sheet-metal bib under the course above to cover the head of the nail. Push the bib past the butt end of the slates in the course above such that the bottom edge of the bib is no longer exposed and the bib provides for the same headlap as the slate. Pre-bend and/or notch the edges of the bib to prevent it from sliding out.

2. Slate Hook Method:

- a. Install the slate hook prior to sliding the replacement slate into position.
- b. Drive the slate hook into the roof deck through the joint between the slates in the course below with the hook aligned with the desired position of the butt of the replacement slate.
- c. Slide the replacement slate up into position, past the hook, and then pull it back down to engage the butt end in the hook.
- d. Do not use slate hooks when replacing multiple adjacent slates in the same course.

3.8 SNOW GUARDS AND SNOW RAILS

A. See Section 077253, Snow Guards, for new snow retention systems.

B. Coordinate installation of new snow retention systems with installation of slate shingles.

1. See Roof Plan for required locations for new snow retention devices.

3.9 LIGHTNING PROTECTION SYSTEMS

A. See Section 264113, Lightning Protection for Structures, for new lightning protection system requirements.

B. Coordinate installation of new lightning protection system with installation of slate shingles.

1. Do not permit lightning protection system components to be secured with fasteners set directly through slate shingles or associated flashings.

2. See Section 264113 for fasteners to be used to secure lightning protection system components in the field of the slate roof. These hook on to the nails used to secure the slate shingles and may be installed by the slate roof installer. The lightning protection installer must be on site to supervise the work.
3. Discuss all lightning protection items to be secured to the roof, flashings, and gutters with the Design Professional prior to commencing work.

3.10 CLEAN-UP AND ADJUSTMENT

- A. Maintain work areas and grounds in a clean and neat manner throughout the course of the work.
- B. Remove debris from gutters and downspouts (if any) at the end of each work day and upon completion of the work to ensure unrestricted flow of water from the roof.
- C. Upon completion of work, remove all roofing equipment, excess material, and debris from all roof surfaces and grounds.
- D. While removing equipment, material, and debris from roof surfaces, inspect all work to ensure completeness, aesthetics, and undamaged workmanship. Broom clean slate shingles as roof jacks and planks (or other means of access) are being removed from the roof.
- E. Dispose of debris in accordance with all local, state, and federal regulations or in the manner as stated elsewhere in the Contract Documents.
- F. Remedy any incomplete work and replace any damaged, broken, poorly lying, or otherwise offending roofing slates using the repair methods specified in Paragraph 3.7, above.
- G. Upon completion of clean up and adjustments, advise the Architect that the work is ready for final inspection and/or punch listing.

END OF SECTION 073126

076200 Sheet Metal Flashing and Trim

1.1 RELATED SECTIONS

- .1 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .2 Section 06 10 53 – Miscellaneous Rough Carpentry.
- .3 Section 07 92 00 – Joint Sealants.

1.2 REFERENCES

- .1 The Aluminum Association Inc. (AA)
 - .1 AA Aluminum Design Manual, Part VIII Guidelines for Aluminum Sheet Metal Work in Building Construction.
 - .2 AA DAF45, Designation System for Aluminum Finishes.
- .2 American Society for Testing and Materials (ASTM International)
 - .1 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM A755/A755M, Standard Specification for Steel Sheet, Metallic coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
 - .3 ASTM A792/A792M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - .4 ASTM D523, Standard Test Method for Specular Gloss.
- .3 Canadian Roofing Contractors Association (CRCA)
 - .1 Roofing Specifications Manual.
- .4 Canadian Standards Association (CSA International)
 - .1 CSA A123.3, Asphalt Saturated Organic Roofing Felt.
 - .2 CSA B111, Wire Nails, Spikes and Staples.
- .5 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI S8, Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products.
 - .2 CSSBI B17, Barrier Series Prefinished Steel Sheet: Product Performance & Applications.
 - .3 CSSBI Sheet Steel Facts #12, Fastener Guide for Sheet Steel Building Products.

1.3 ACTION AND INFORMATION SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature including product specifications and technical data sheets for sheet metal flashing fasteners and accessory materials. Include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit shop drawings for all sheet metal fabrications.
 - .2 Indicate sheet thickness, flashing dimensions and fastenings. Include anchorage, expansion joints and other provisions for thermal movement.
 - .3 Submit manufacturer's catalogue cut sheets for manufactured items.
- .4 Samples:
 - .1 Submit 50 x 50 mm samples of each type of sheet metal material, finishes and colour.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Handle and store flashing materials to prevent creasing, buckling, scratching, or other damage.

PART 2 PRODUCTS

2.1 SHEET METAL MATERIALS

- .1 Provide sheet metal in base metal thickness specified. Where no thickness specified, provide base sheet metal in thickness recommended in SMACNA Architectural Sheet Metal Manual for type of item being fabricated, but not less than the thickness required by the authority having jurisdiction.
- .2 Aluminum-zinc alloy coated steel sheet: to ASTM A792/A792M, commercial quality, grade 33 with AZ150 coating, regular spangle surface, 0.60 mm base metal thickness. Pre-painted to CGSB –GP-71.

2.2 PREFINISHED STEEL SHEET

- .1 Prefinished steel with factory applied two-coat polyvinylidene fluoride resin on specified steel sheet substrate conforming to ASTM A755.
 - .1 Class F1S
 - .2 Colour as selected by Owner from manufacturer's standard range.
 - .3 Specular gloss: 30 units +/- 5 in accordance with ASTM D523.
 - .4 Exposed coating thickness: dry film coating system thickness not less than 22 micrometres.
 - .5 Resistance to accelerated weathering for caulk rating of 8, colour fade 5 units or less and erosion rate less than 20 % to ASTM D822 as follows:
 - .1 Outdoor exposure period 2500 hours.
 - .2 Humidity resistance exposure period 5000 hours.

2.3 ACCESSORIES

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Underlay for metal flashing: No. 15 perforated asphalt felt to CSA A123.3.
- .3 Sealants: Section 07 92 00 – Joint Sealants.
- .4 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.
- .5 Fasteners: of same material as sheet metal, to CSA B111, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.
- .6 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .7 Touch-up paint: as recommended by prefinished material manufacturer.

2.4 FABRICATION

- .1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details as indicated.
- .2 Fabricate aluminum flashings and other sheet aluminum work in accordance with Aluminum Association Aluminum Sheet Metal Work in Building Construction.
- .3 Form pieces in 2400 mm maximum lengths. Make allowance for expansion at joints.

- .4 Hem exposed edges on underside 12 mm. Mitre and seal corners with sealant.
- .5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .6 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.5 METAL FLASHINGS

- .1 Form flashings, copings and fascias to profiles indicated of 0.60 mm thick prefinished steel.

PART 3 EXECUTION

3.1 INSTALLATION

- .1 Install sheet metal work in accordance with CRCA FL series details and as detailed.
- .2 Use concealed fastenings except where approved before installation.
- .3 Provide underlay under sheet metal. Secure in place and lap joints 100 mm.
- .4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips, as detailed.
- .5 Lock end joints and caulk with sealant.
- .6 Where flashing installed with mechanical fasteners, install fasteners in slots or oversize holes to allow expansion and contraction of flashings.
- .7 Provide isolation coating or impervious self-adhesive membrane to separate aluminum items from concrete and masonry.

3.2 CLEANING

- .1 Proceed in accordance with Section 01 74 00 – Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

SECTION 265600 - EXTERIOR LIGHTING

1. GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior luminaires with lamps and drivers.
2. Luminaire supports.
3. Luminaire-mounted photoelectric relays.

B. Related Documents & Sections:

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections apply to the work of this Section.
2. Division 26 "Basic Materials and Methods" sections apply to the work in this Section.

C. Coordination Requirements:

1. Coordinate the installation of all light fixtures with the work of other trades. This includes but is not limited to placement of fixtures in conjunction with civil work such as sidewalks, roadways, parking lots, landscaping and building exteriors.
2. Coordinate the installation of all light fixtures with mounting surfaces fixtures will be mounted within, onto, or through. Coordinate placement of fixture supports, anchors, and mounts in conjunction with ceiling and wall system supports, anchors and mounts. Light fixture trims shall be coordinated with ceiling and wall surfaces.
3. Coordinate the installation of all light fixtures with required external surge protection devices. See Paragraphs 2.5 & 2.8 below for more on surge protection requirements.

1.2 SUBMITTALS

A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, and finishes.

1. Submit manufacturer's product datasheet on each and every lighting fixture.
2. Furnish shop drawing portfolios (collated & bound sets) containing the following information:
 - a. Name of manufacturer, make and model of each particular fixture in the project.
 - b. Product listing information (UL, ETL, DLC, Dark Sky, etc...)
 - c. Descriptive cut sheets Indicate fixture catalog number selections, highlight or make obvious which part numbers are used to build the complete fixture catalog number.
 - d. Complete photometric information and coefficient of utilization tables.
 - e. Fixture voltage, match to project specifics.

- f. Wiring diagrams for power, control, and signal wiring.
 - g. Photoelectric relays and how they interconnect into the system schematically.
 - h. The number, type and wattage of the fixture lamps. Include lamp rated life, color temperature, color rendering index (CRI), initial & mean lumen output.
 - i. The wattage and illumination information for LED fixtures. Include rated life, color temperature, CRI, initial & mean lumen output of LED fixtures.
 - j. Lens information including type, pattern, thickness, material type, special features.
 - k. Fixture options, mounting details and ceiling compatibility information.
 - l. Construction of fixture housing and door, door type, access hole information.
 - m. Fixture ballast and driver manufacturer and type information.
 - n. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.
3. All lighting fixtures required to be used on this project shall be submitted in one single submittal so that all fixtures can be reviewed at one time. Those fixtures not receiving a shop drawing action of "Reviewed" or "Reviewed and Noted" on the first submittal shall be resubmitted for review. A light fixture receiving a shop drawing action of "Resubmit" or "Rejected" after the third review for any reason, shall be furnished as originally specified.
 4. The portfolios shall be made from standard manufacturer's specification sheets. Each fixture shall be identified by the letter or number indicated on the fixture schedule or project plan sheets as applicable. The combining of more than one fixture type of fixture on a single sheet shall not be acceptable.
- B. Shop Drawings for nonstandard or custom lighting fixtures: Show details indicating dimensions, weights, methods of field assembly, components, features, and accessories. Product Certificates: For each type of ballast and driver, dimmer-controlled fixtures, provided by manufacturer.
 - C. Product Schedule: For all luminaires and lamps, using the same designations as on the Project Drawings.
 - D. Qualification Data: For testing laboratory providing photometric data for luminaires.
 - E. Product Certificates: For each luminaire type and for each photoelectric relay type.
 - F. Product Test Reports: For each luminaire, for tests performed by a qualified testing agency. Provide all applicable source quality-control reports.
 - G. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
 - H. Provide all applicable field quality-control reports.
 - I. Project Record Documents: Record actual connections and locations of luminaires and any associated remote mounted components. Provide this information along with project 'as-builts' per the contract documents plans and specifications.

- J. Warranty: Provide a copy of the sample warranty prior to commencement of work. Include a copy of the final approved warranty in the project close out documentation.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with IEEE C2, "National Electrical Safety Code."
- C. Comply with NFPA 70.
- D. Manufacturers: Firms regularly engaged in the manufacturer of interior and exterior light fixtures of types and ratings required, whose products have been in satisfactory use in similar service for not less than three (3) years.
- E. Installer: Qualified with at least three (3) years of successful installation experience on projects with interior and exterior lighting fixture work similar to that required for this project.
- F. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturers' laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- G. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products and complying with applicable IES testing standards.
- H. Provide luminaires from a single manufacturer for each luminaire type.
- I. Mockups: As required on a project-by-project basis (typically not required) for exterior luminaires, complete with power and control connections.
 - 1. Obtain Architect's approval of luminaires in mockups before starting installations.
 - 2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed work.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 REFERENCES

- A. NEC Compliance: Comply with the NEC (NFPA 70) as applicable to the installation and construction of lighting fixtures.
- B. NEMA Compliance: Comply with applicable requirements of NEMA Standard Pub. Nos. LE-1 and LE-2 pertaining to lighting equipment.
- C. ANSI/UL Compliance: Comply with ANSI/UL Standards pertaining to interior and exterior lighting fixtures for hazardous locations. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements.
- D. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits.
- E. IESNA LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; Illuminating Engineering Society.
- F. IESNA LM-80 - Approved Method: Measuring Lumen Maintenance of LED Light Sources.
- G. NECA 1 - Good Workmanship in Electrical Construction, latest edition.
- H. NECA/IESNA 501 – Standard for Installing Exterior Lighting Systems, latest edition.
- I. Underwriter’s Laboratories (UL) Listings. Provide fixtures that have been UL Listed and labeled to any or all of the following standards as applicable to the project:
 - 1. UL 844 - Luminaires for Use in Hazardous (Classified) Locations.
 - 2. UL 924 - Emergency Lighting and Power Equipment.
 - 3. UL 1598 - Luminaires.
 - 4. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products.

1.5 DELIVERY, STORAGE AND PROTECTION

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 501 (exterior lighting), NECA/IESNA 502 (industrial lighting), and all manufacturer’s written instructions.
- B. Keep fixtures in original product packaging until ready for installation. Do not leave unpackaged fixtures unattended or where they are subject to dirt, debris, or damage.
- C. All fixtures shall be kept warm, dry, safe and secure. Adhere to manufacturer storage requirements.
- D. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

1.6 EXTRA MATERIALS

- A. At substantial completion of the project, furnish the following extra materials that match specified and installed products to the Owner for future use after completion of project warranty periods. Extra materials shall be delivered and stored at a location or locations directed by the Owner. Products shall be packaged with protective covering for storage and shall be suitably labeled by product type.
1. Provide ten extra lamps for every 100 lamps (of each rating and type) installed on the project. Provide a minimum of at least one extra lamp for each lamp type and rating used.
 2. Provide one extra lens or louver for every 100 units (of each type) installed on the project. Provide a minimum of at least one extra lens and one extra louver for each type used.
 3. Provide one extra driver for every 100 units (of each type) installed on the project. Provide a minimum of at least one extra driver for each type used.
 4. Provide one extra set (complete set) of fuses for every 100 units (of each type) installed on the project. Provide a minimum of at least one set of fuses for each type used.
 5. Provide one extra photoelectric relay for every 100 units (of each type) installed on the project. Provide a minimum of at least one extra photoelectric relay for each type used.

1.7 WARRANTY

- A. Provide a five (5) year manufacturer warranty for all exterior fixtures, LED drivers, and LED light boards (light engines) from date of substantial completion of the project. This warranty to cover all product defects, performance criteria, and parts.
- B. Manufacturer and installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures, including luminaire support components.
 - b. Faulty operation of luminaires and accessories.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. PRODUCTS

2.1 FIXTURES, GENERAL

- A. All fixtures shall be UL or other qualified third party listed for the environment where they will be installed including: damp, wet, extreme temperature, or hazardous locations.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- C. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.
- D. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.
 - 1. LER Tests Incandescent Fixtures: Where LER is specified, test according to NEMA LE 5A.
- E. Lateral Light Distribution Patterns: Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.
- F. Metal Parts: Free of burrs and sharp corners and edges.
- G. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.
- H. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.
- I. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.
- J. Exposed Hardware Material: Stainless steel.
- K. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
- L. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.
- M. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
- N. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- O. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
- P. Variations in Luminaire Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if

they are within the range of approved samples and are assembled or installed to minimize contrast.

Q. Diffusers and Globes:

1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
2. Glass: Annealed crystal glass unless otherwise indicated.
3. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

R. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp and ballast characteristics:
 - a. "USES ONLY" and include specific lamp type.
 - b. Lamp diameter, shape, size, wattage and coating.
 - c. CCT and CRI for all luminaires.

S. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant to withstand common vibrations encountered at installation site.

1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

2.2 MANUFACTURERS

A. Manufacturers: As noted on the drawings by notes and/or by the light fixture schedule dictated by this Section. Subject to compliance with requirements, provide products by one following:

1. Pedestrian Lighting: Lithonia KBDX LED Series
2. Landscape Lighting: Lithonia TFX2 Series

2.3 LUMINAIRE SUPPORT COMPONENTS

A. Comply with general requirements found in the UNL Design Guidelines. Comply with all manufacturer written instructions for the physical characteristics and installation procedures.

2.4 LED LIGHTING FIXTURES

A. Complete LED lighting fixtures for general illumination shall have been tested by IES LM-79 and LM-80 requirements.

B. LED light fixtures shall be fabricated, assembled, and manufactured as a complete fixture unit, including housing, mounting hardware, driver, light boards (light engines), and lens.

- C. LED lighting fixtures shall allow for separate replacement of the light boards and driver. In other words, 'throw away' fixtures with non-replaceable components are not permitted.
- D. LED lighting fixtures shall be capable of continuous dimming as a standard offering. Dimming range to be from 100% to at least 20% of rated lumen output. Dimming control shall be 0-10VDC.
- E. All LED fixture control devices shall be compatible with the type of drivers and dimming requirements of the particular project and coordinated with the lighting fixture submittals prior to ordering.
- F. Universal input voltage (120-277 VAC) drivers shall be provided for all LED applications.
- G. In-line fusing: On the primary for each luminaire.

2.5 LED DRIVERS

- A. Drivers shall operate from a 60Hz input AC voltage from 120V-277V. Unit shall have an input voltage tolerance range of at least +/- 10%.
- B. The Total Harmonic Distortion (THD) of the driver input current shall be no more than 20% when operating at nominal input voltage.
- C. Drivers shall have a minimum Power Factor (PF) of 0.90.
- D. Drivers shall comply with IEEE/ANSI C62.41 Category C2 (medium) for transient voltage protection. This shall include a 10kV rating, and 5kA rating per the standard 8x20us combo wave testing parameters.
- E. Drivers shall comply with the requirements of the FCC rules and regulations, Title 47 CFR Part 18, Non-consumer (Class A) for EMI & EMF (conducted and radiated) interference.
- F. Fixtures may require additional surge protection apart from what is integral with the LED driver. See Paragraph 2.8 below for more details.

2.6 LED BOARDS

- A. Rated minimum life of 60,000 hours minimum per IES LM-70 testing requirements.
- B. Provide a TM21 report on LED boards to be used which tests LED life and lumen maintenance per the IES LM-80 standard, and LED light output and efficacy per the IES LM-70 standard.
- C. The correlated color temperature (CCT) of the LEDs shall be 4000K unless noted otherwise. The CCT shall be uniform for all LED modules within like luminaire types and luminaires within a given project. The LED CCT measurements shall have a

maximum of three standard deviations (3 SDCM, +/-90K) tolerance on the MacAdam Ellipse.

- D. Provide LED boards such that any individual LED failure on a section of LED board within the fixture will not result in significant output loss of the overall fixture.

2.7 LUMINAIRE-MOUNTED PHOTOELECTRIC RELAYS

- A. Comply with UL 773 or UL 773A.
- B. Contact Relays: Factory mounted, single throw, designed to fail in the on position, and factory set to turn light unit on at 1.5 to 3 fc (16 to 32 lx) and off at 4.5 to 10 fc (48 to 108 lx) with 15-second minimum time delay. Relay shall have directional lens in front of photocell to prevent artificial light sources from causing false turnoff.
 - 1. Relay with locking-type receptacle shall comply with ANSI C136.10.
 - 2. Adjustable window slide for adjusting on-off set points.

2.8 EXTERNAL LED DRIVER SURGE PROTECTION DEVICE (SPD)

- A. All pole mounted LED light fixtures, and pole mounted outdoor sports lighting LED products shall come equipped with an additional layer of SPD protection. This additional protection shall be in addition to requirements of the surge protection integral to the LED driver itself.
- B. The SPD shall be circuited immediately upstream of the LED driver and mounted either within the fixture or immediately adjacent to it in a concealed, protected, and accessible location. Do not void manufacturer warranty or listing requirements when mounting the SPD.
- C. The external SPD shall be circuited either in series or parallel with the light fixture circuit as required of the project and Owner needs. In series circuiting shall de-energize the fixture upon SPD failure (indicating a problem) while parallel circuiting shall allow for continued fixture use after SPD failure.
- D. The additional SPD shall have a kilo-amp rating in excess of the kilo-amp rating of the fixture it is protecting. Minimum specifications shall meet IEEE/ANSI Category C2 (medium) 10kV, 5kA@ 8/20us standard combo and 6kV, 100kHz ring wave protection.
- E. The additional SPD shall have a let-through voltage rating or Voltage Performance Rating (VPR) that limits the voltage to the downstream driver to within the voltage tolerance of the driver. Anticipated maximum clamping voltage (8/20us @ 10kA) as follows: 600V (120V circuit), 1000V (208-240V circuit), 1500V (277V circuit), and 2500V (480V circuit).

3. EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.
- C. Examine walls, roofs, canopy ceilings and overhang ceilings for suitable conditions where luminaires will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

- A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is substantially complete, clean luminaires used for temporary lighting and install new lamps.

3.3 LUMINAIRE INSTALLATION

- A. Install lamps in each luminaire.
- B. Fasten luminaire to indicated structural supports. Additional support requirements include:
 - 1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
 - 2. Sized and rated for luminaire weight.
 - Able to maintain luminaire position after cleaning and relamping.
 - 3. Support luminaires without causing deflection of finished surface.
 - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100
 - 5. percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- C. Wall-Mounted Luminaire Support:
 - 1. Attached to structural members in walls.
- D. Wiring Method: Install cables in raceways. Conceal raceways and cables.
- E. Install luminaires level, plumb, and square with finished grade unless otherwise indicated. Install luminaires at height and aiming angle as indicated on Drawings.
- F. Coordinate layout and installation of luminaires with other construction.

- G. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.
- H. Comply with requirements in Section 260519 "Conductors", Section 260526 "Grounding System", and Section 260533 "Raceways" for wiring connections and wiring methods.

3.4 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- B. Steel Conduits: Comply with Section 260533 "Raceways" In concrete foundations, wrap conduit with 0.010-inch- (0.254-mm-) thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.5 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals.

3.6 FIELD QUALITY CONTROL

- A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.
- B. Perform the following tests and inspections:
 - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
 - 2. Verify operation of photoelectric controls.
- C. Illumination Tests:
 - 1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IES testing guide(s):
 - a. IES LM-5.
 - b. IES LM-50.
 - c. IES LM-52.
 - d. IES LM-64.
 - e. IES LM-72.
 - 2. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
- D. Luminaire will be considered defective if it does not pass tests and inspections.

- E. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

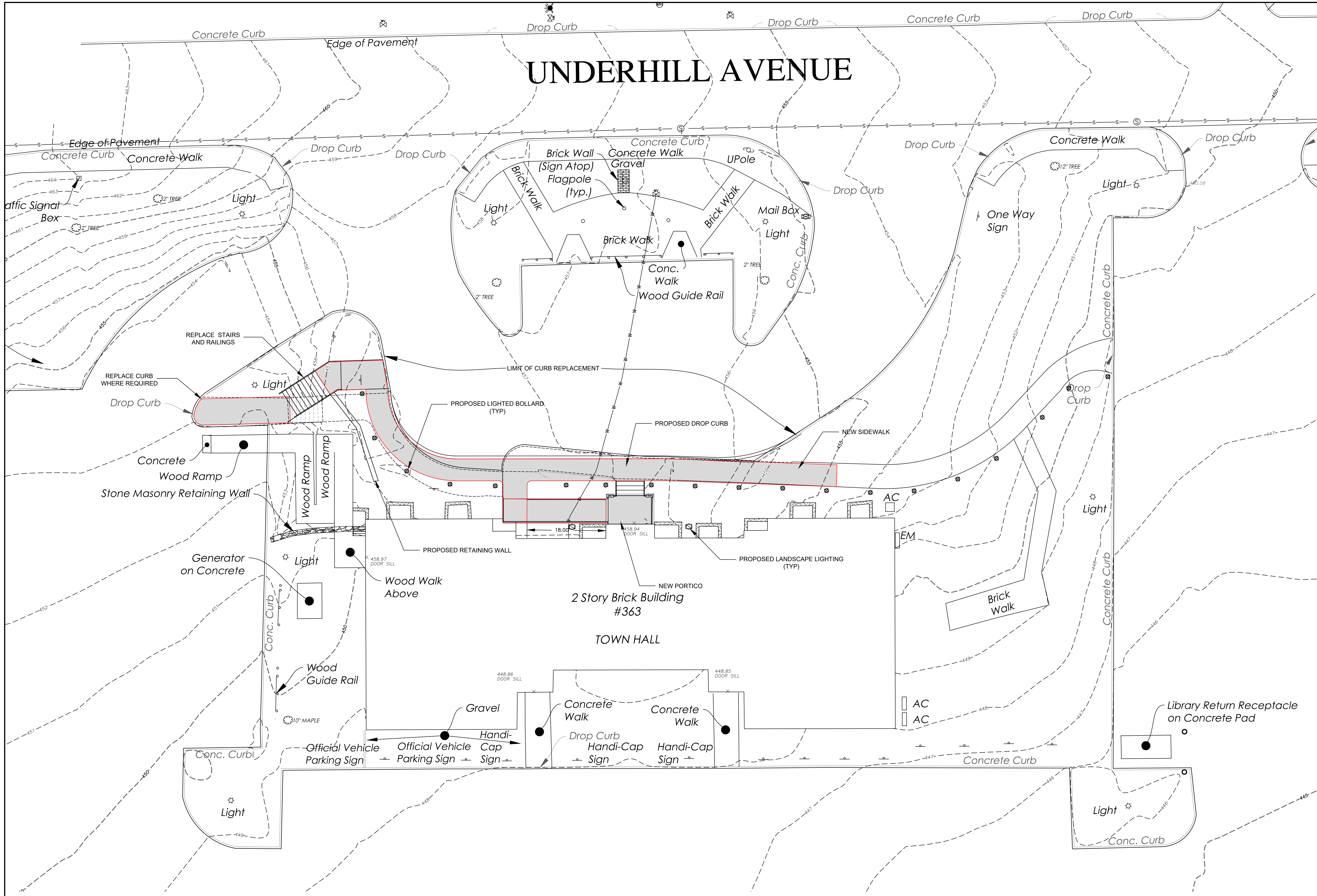
3.7 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain luminaires and photocell relays.

3.8 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
 1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
 2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 3. Adjust the aim of luminaires in the presence of the Architect and UNL Project Manager.

END OF SECTION 265600



UNDERHILL AVENUE

2 Story Brick Building
#363
TOWN HALL

SITE PLAN
SCALE: 1"=10'

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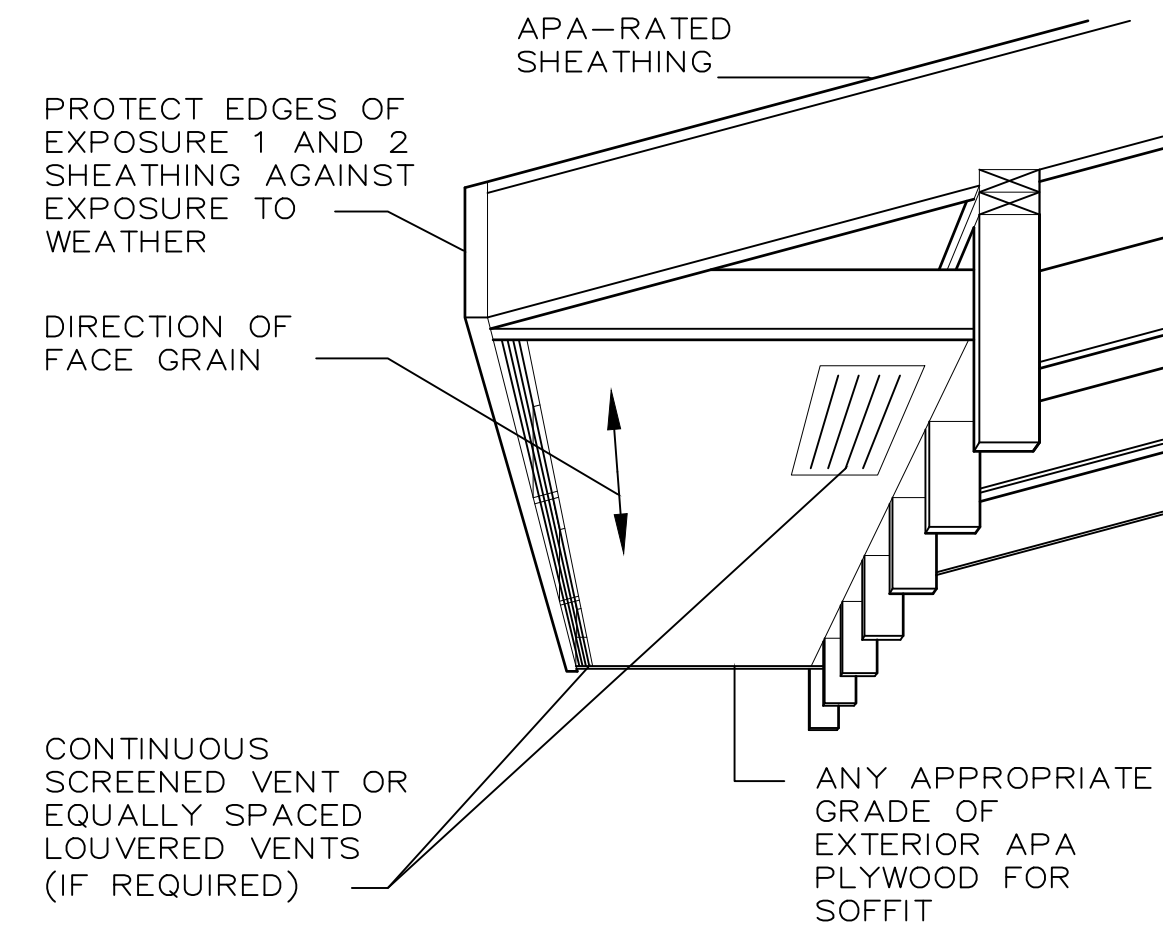
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Project owner: TOWN OF YORKTOWN, NEW YORK 363 UNDERHILL AVENUE YORKTOWN, N.Y. 10598 MATTHEW SLATER, SUPERVISOR THOMAS DIANA, COUNCILPERSON SERGIO ESPOSITO, COUNCILPERSON LUCIANA HOUGHWOUT, COUNCILPERSON ED LACHTERMAN, COUNCILPERSON DIANA QUIAST, TOWN CLERK	

New Stairs, Ramps, Walks at Town Hall

Yorktown Town Hall
363 Underhill Avenue, Yorktown, N.Y.

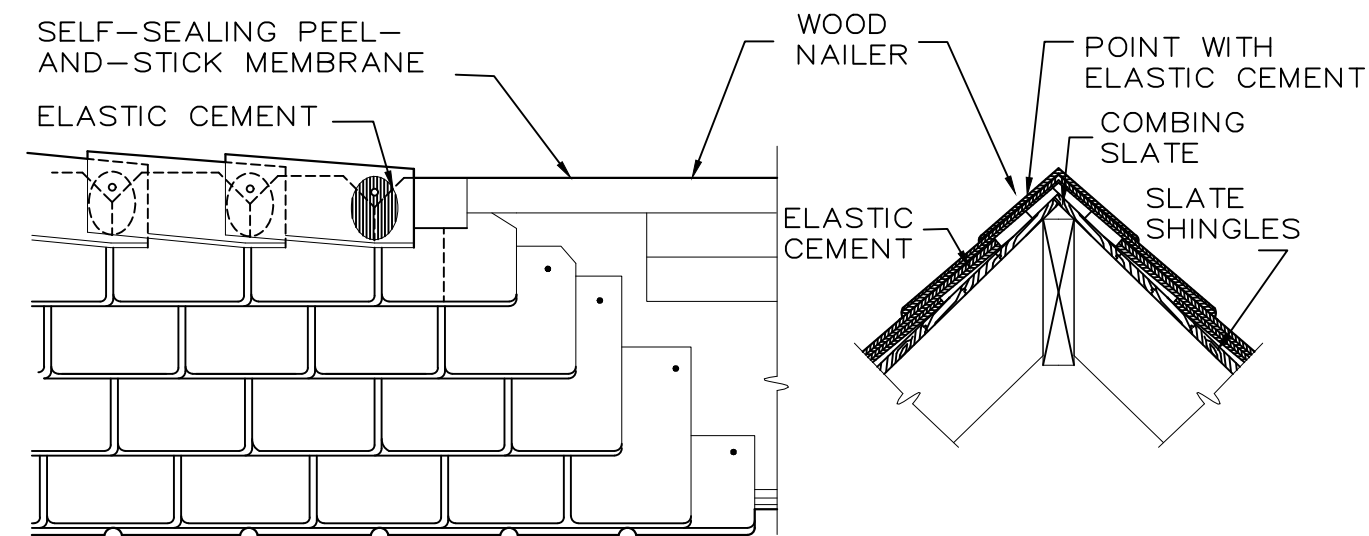
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ROOF FRAMING DETAIL

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SHINGLE DETAIL

14

KBDB LED LED Specification Bollard

Specifications
 Height: 30" (762mm)
 Weight: 12.5 lbs (5.7kg)
 Width: 4" (102mm)

Introduction
 The KBDB Bollard is a stylish, fully integrated LED solution for walkways. It features a sleek, modern design and is carefully engineered to provide long-lasting, energy-efficient lighting with a variety of optical and control options for customized performance. With an expected service life of over 20 years of nighttime use and up to 70% in energy savings over comparable 100W metal halide luminaires, the KBDB Bollard is a reliable, low-maintenance lighting solution that produces sites that are exceptionally illuminated.

Ordering Information
 Order Code: KBDB LED 16C 700 30K SYM MVOLT DBLXD

Model	LEDs	Drive current	Color temperature	Dimensions	Material	Control options	Other options	Finish options
KBDB LED 16C 700 30K SYM MVOLT DBLXD	Asymmetric 12 LEDs	350 350 mA	3000 K	4" x 4" x 30"	Aluminum	None	None	White, Dark Bronze
	Symmetric 12 LEDs	350 350 mA	3000 K	4" x 4" x 30"	Aluminum	None	None	White, Dark Bronze
	Asymmetric 12 LEDs	350 350 mA	3000 K	4" x 4" x 30"	Aluminum	None	None	White, Dark Bronze
	Symmetric 12 LEDs	350 350 mA	3000 K	4" x 4" x 30"	Aluminum	None	None	White, Dark Bronze

Accessories
 M848 U Anchor bolts for KBDB LED 8

LIGHTED BOLLARD DETAIL

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Contractor Select™

TFX LED Floodlights

The TFX LED floodlights from Lithonia Lighting deliver the best value in lighting from a brand you can trust. Superior performance and design make this product suitable for any general purpose floodlighting application.

FEATURES:

- Ideal solution to replace up to 1000W metal halide floodlights
- Floodlight pays for itself in less than 2 years
- Robust design and cost effective — ideal for outdoor installations

Luminaire	CCT	Lumens	Input Watts	Finish	Voltage	Catalog Number	CI Code	UPC
TFX1	4000K	7,300	54W	DARK BRONZE	120-277V	TFX1 LED 40K MVOLT THK DBBXD M8	*2552MS	193047670173
	4000K	13,200	94W	DARK BRONZE	120-277V	TFX2 LED 40K MVOLT IS DBBXD	*2552MC	193047670241
TFX2	4000K	13,200	94W	DARK BRONZE	120-277V	TFX2 LED 40K MVOLT YK DBBXD	*2552ME	193047670234
	5000K	13,200	94W	DARK BRONZE	120-277V	TFX2 LED 50K MVOLT YK DBBXD	*2581FK	193048041552
TFX3	4000K	25,600	188W	DARK BRONZE	120-277V	TFX3 LED 40K MVOLT IS DBBXD	*2552MF	193047670265
	4000K	25,600	188W	DARK BRONZE	120-277V	TFX3 LED 40K MVOLT YK DBBXD	*2552MJ	193047670258
	4000K	41,000	296W	DARK BRONZE	120-277V	TFX4 LED 40K MVOLT IS DBBXD	*2552MM	193047670302
TFX4	4000K	41,000	296W	DARK BRONZE	120-277V	TFX4 LED 40K MVOLT YK DBBXD	*2552MN	193047670326

LANDSCAPE LIGHTING DETAIL

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Prepared by:
 TOWN OF YORKTOWN
 ENGINEERING DEPARTMENT
 363 UNDERHILL AVENUE
 YORKTOWN, N.Y. 10598

Project owner:
 TOWN OF YORKTOWN, NEW YORK
 363 UNDERHILL AVENUE
 YORKTOWN, N.Y. 10598
 MATTHEW SLATER, SUPERVISOR
 THOMAS DIANA, COUNCILPERSON
 SERGIO ESPOSITO, COUNCILPERSON
 LUCIANA HOUGHWOUT, COUNCILPERSON
 ED LACHTERMAN, COUNCILPERSON
 DIANA QUIAST, TOWN CLERK

Project Title:
**New Stairs, Ramps,
 Walks at Town Hall**
 Yorktown Town Hall
 363 Underhill Avenue, Yorktown, N.Y.

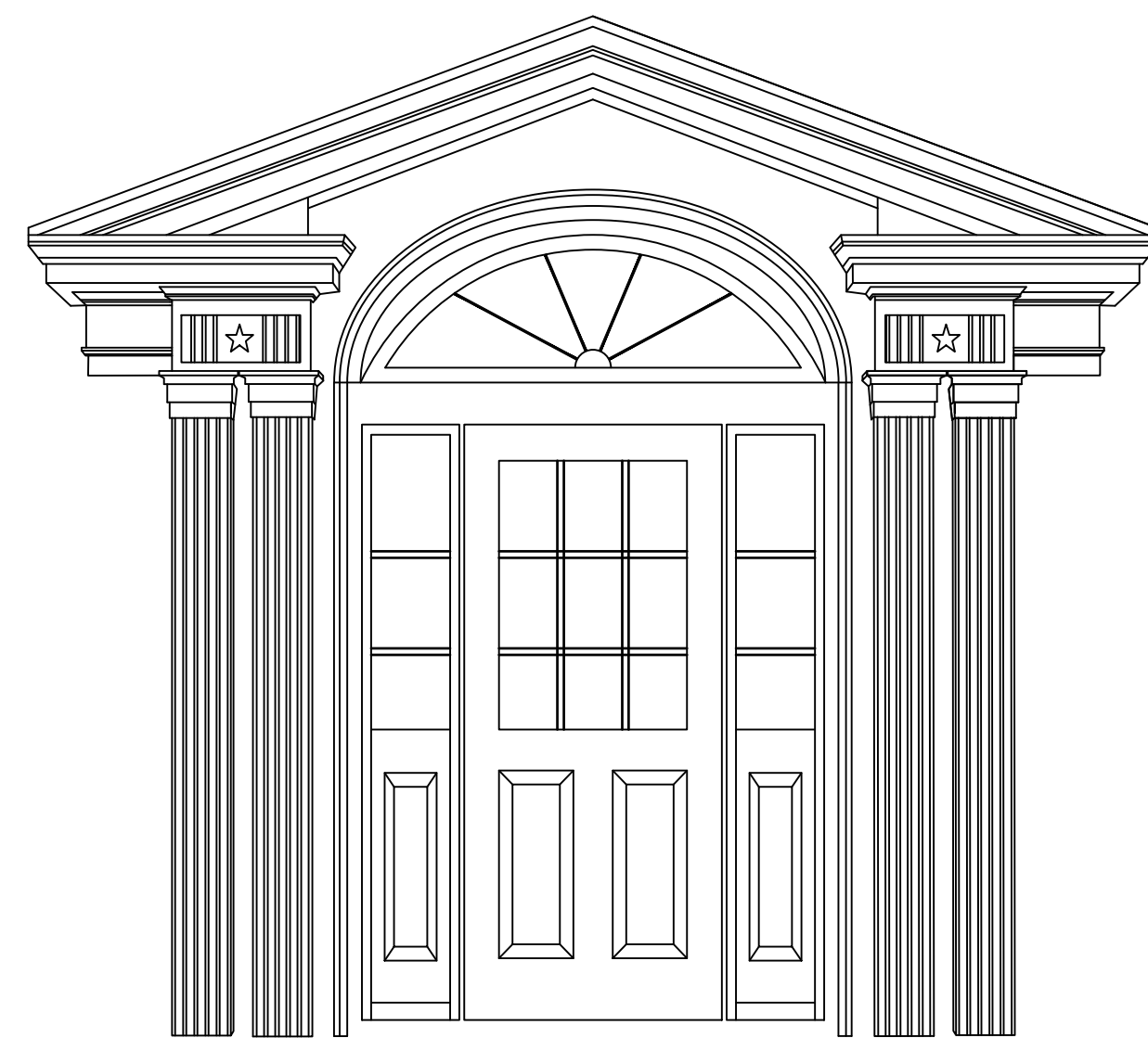
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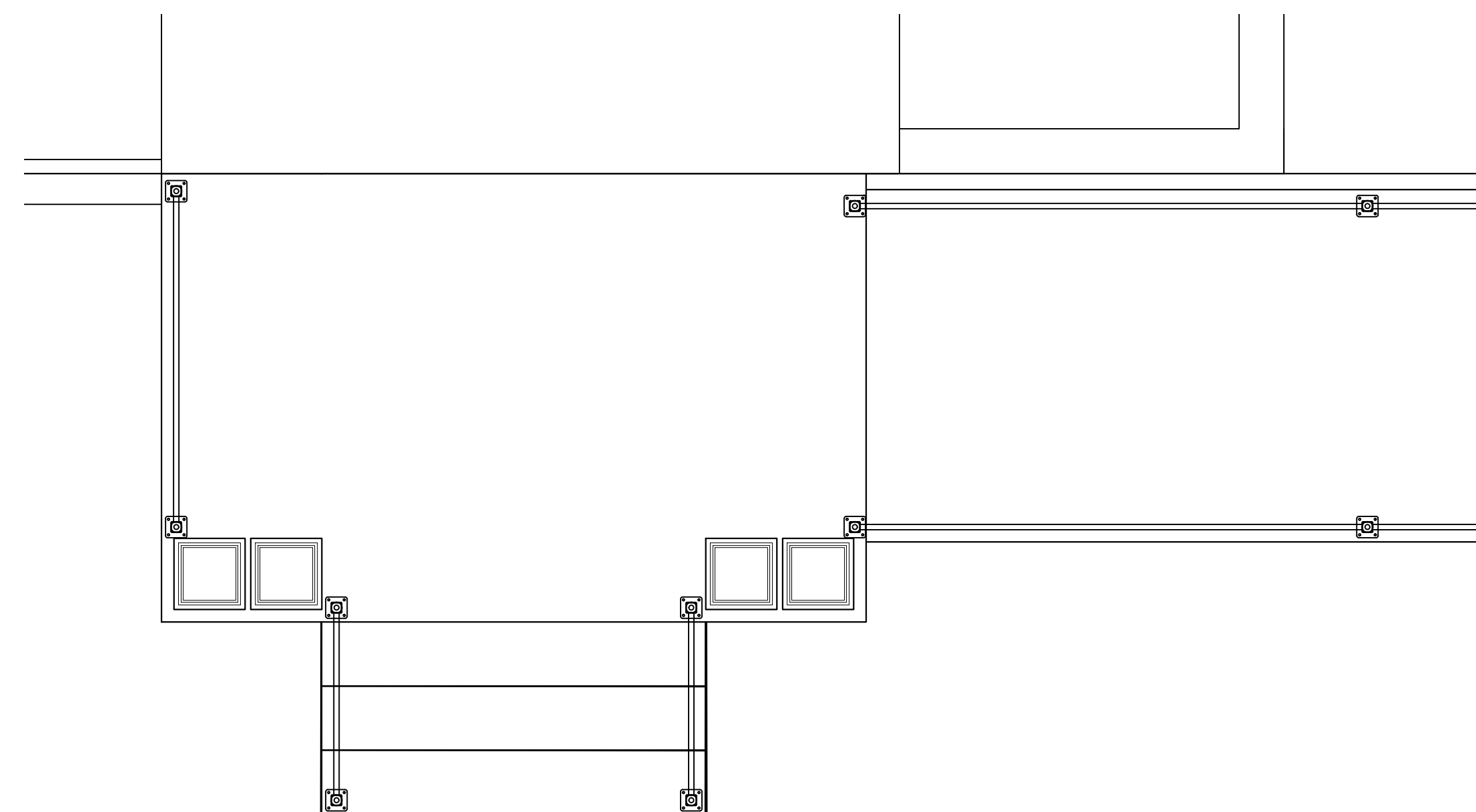
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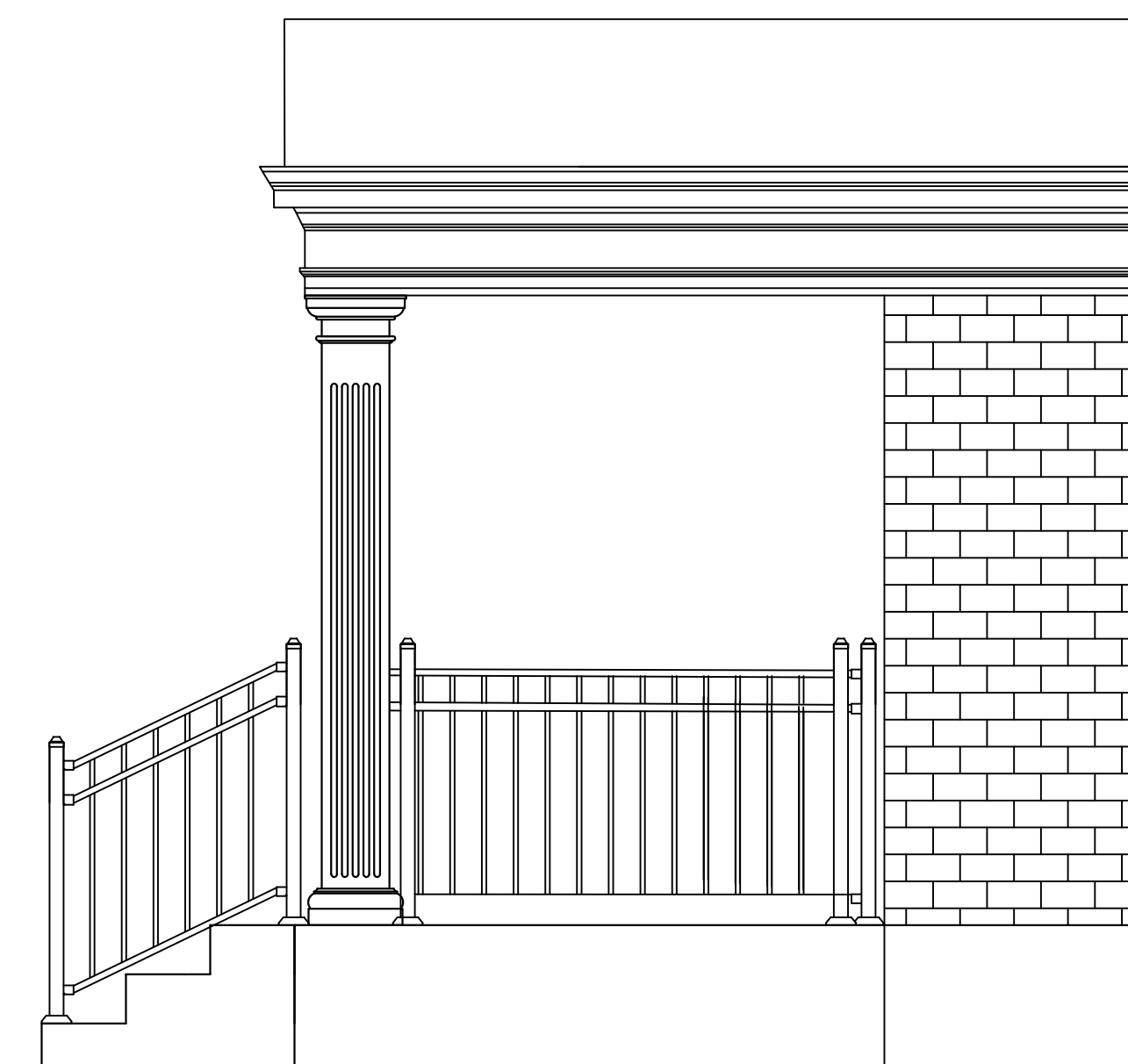
EXISTING ENTRANCE
 SCALE: 1/2"=1'-0"



PROPOSED ENTRANCE
 SCALE: 1/2"=1'-0"



PORTICO PLAN
 SCALE: 1/2"=1'-0"



PROPOSED SIDE ENTRANCE
 SCALE: 1/2"=1'-0"

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Prepared by:
 TOWN OF YORKTOWN
 ENGINEERING DEPARTMENT
 363 UNDERHILL AVENUE
 YORKTOWN, N.Y. 10598

Project owner:
 TOWN OF YORKTOWN, NEW YORK
 363 UNDERHILL AVENUE
 YORKTOWN, N.Y. 10598
 MATTHEW SLATER, SUPERVISOR
 THOMAS DIANA, COUNCILPERSON
 SERGIO ESPOSITO, COUNCILPERSON
 LUCIANA HOUGHWOUT, COUNCILPERSON
 ED LACHTERMAN, COUNCILPERSON
 DIANA QUIAST, TOWN CLERK

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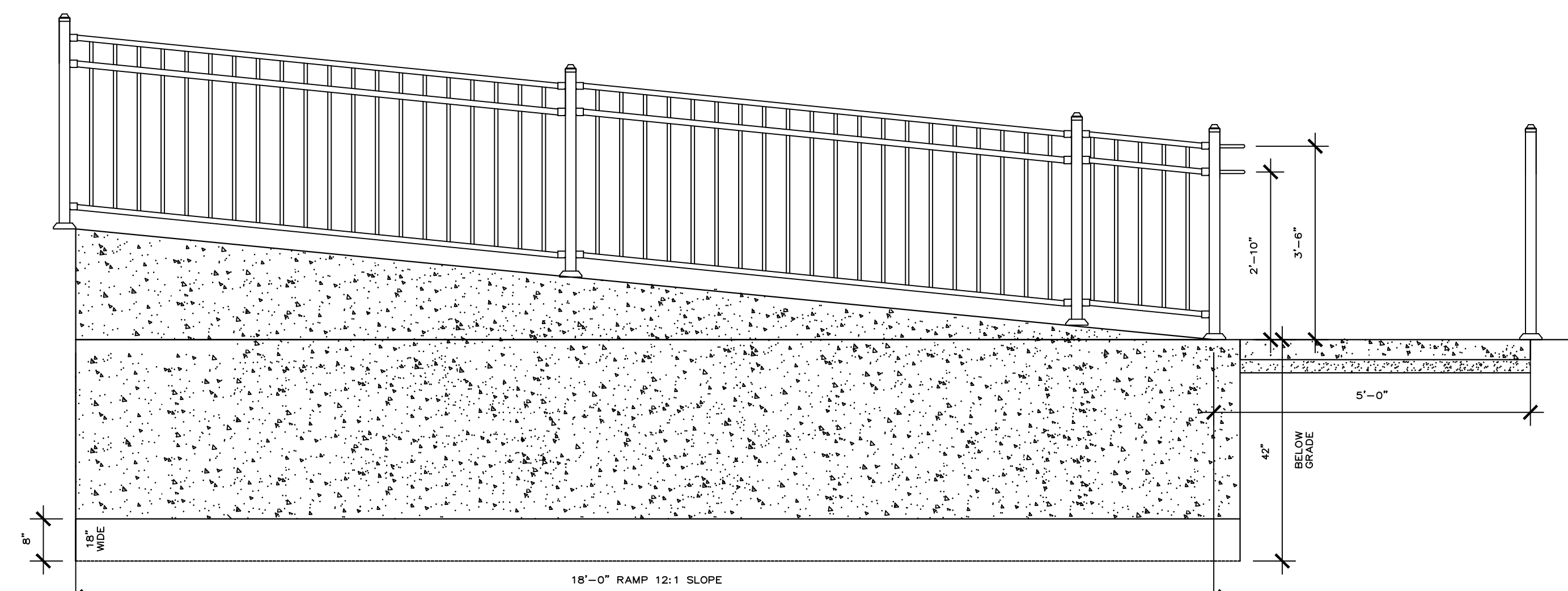
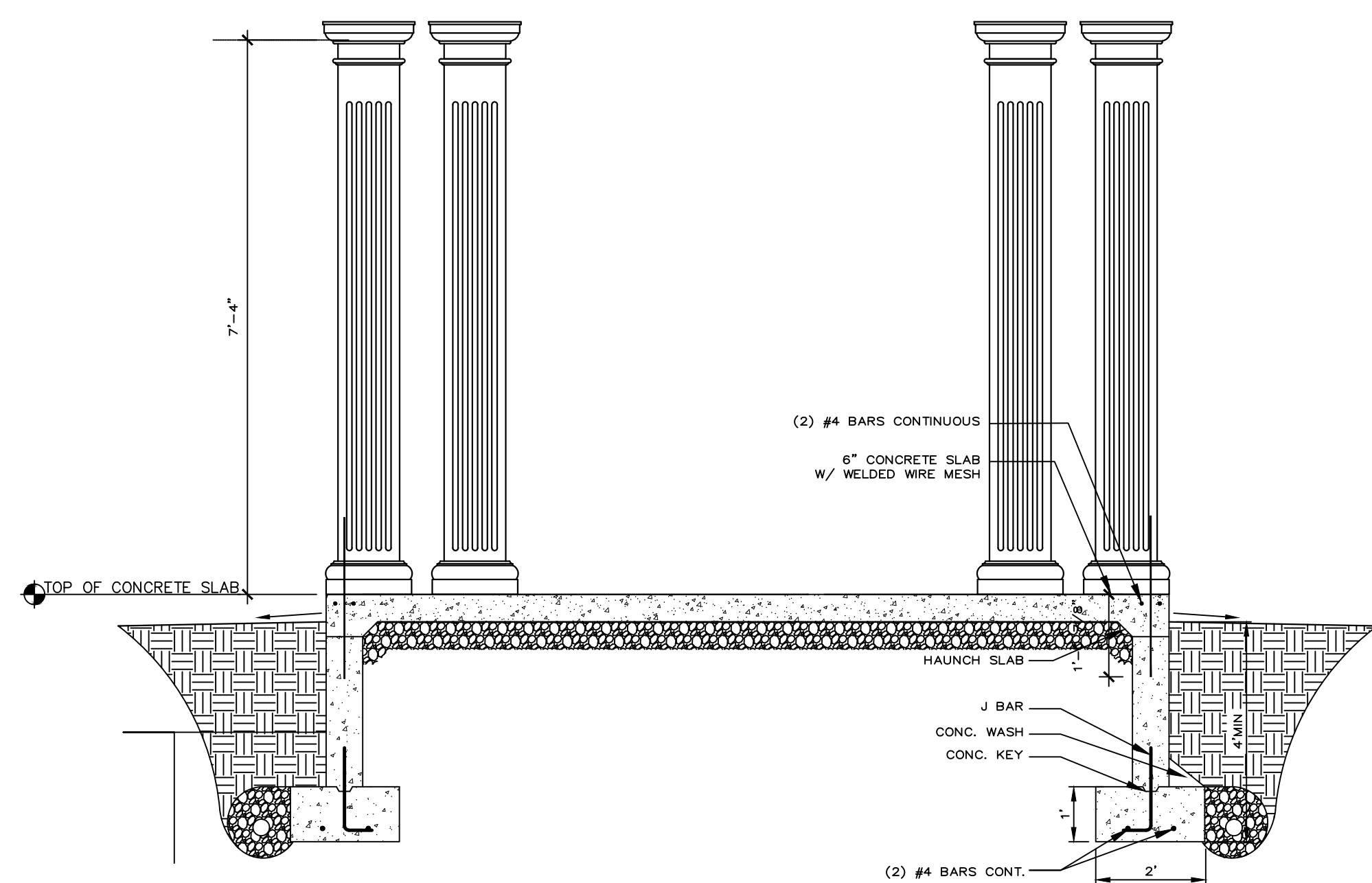
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Prepared by:
 TOWN OF YORKTOWN
 ENGINEERING DEPARTMENT
 363 UNDERHILL AVENUE
 YORKTOWN, N.Y. 10598

Project owner:
 TOWN OF YORKTOWN, NEW YORK
 363 UNDERHILL AVENUE
 YORKTOWN, N.Y. 10598
 MATTHEW SLATER, SUPERVISOR
 THOMAS DIANA, COUNCILPERSON
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