TECHNICAL SPECIFICATIONS

March 30, 2015

PHASE 3:
SITE IMPROVEMENTS FOR
THE VAN WAGENEN/APPLE TREE HOUSE

PROJECT # 2010-029

CITY OF JERSEY CITY
HONORABLE STEVEN M. FULOP, MAYOR

DEPARTMENT OF PUBLIC WORKS
DIVISION OF ARCHITECTURE,
ENGINEERING AND TRAFFIC
13-15 LINDEN AVENUE EAST
FIRST FLOOR
JERSEY CITY, NEW JERSEY 07305

ARNOLD ASSOCIATES
Landscape Architects
40 Witherspoon Street
Princeton, NJ 08542

50 STATES ENGINEERING
Civil Engineers
85 Midtown Bridge Approach
Hackensack, NJ 07601

H M R ARCHITECTS
821 Alexander Rd. Suite 115
Princeton, New Jersey 08540
T 609.452.1070 F 609.452.1074

SPECIFICATIONS FOR THE
LABOR AND MATERIALS REQUIRED FOR

PROJECT:	APPLE TREE HOUSE - PHASE III - SITE IMPROVEMENTS
LOCATION:	298 ACADEMY STREET JERSEY CITY, NEW JERSEY 07307
OWNER:	CITY OF JERSEY CITY 280 GROVE STREET JERSEY CITY, N.J. 07302 HONORABLE STEVEN M. FULOP, MAYOR ROBERT KAKOLESKI, BUSINESS ADMINISTRATOR PETER FOLGADO, PURCHASING AGENT, RPPO, QPA
PROJECT ARCHITECTS:	DIVISION OF ARCHITECTURE 13 - 15 LINDEN AVENUE EAST, FIRST FLOOR JERSEY CITY, NEW JERSEY 07305 (201) 547-5900
CONSULTANT:	HMR ARCHITECTS, P.A. 821 ALEXANDER STREET, SUITE 115 PRINCETON, NEW JERSEY 08540 ERIC HOLTERMANN, A.I.A. (609) 452-1070
DATE:	MARCH, 2015
PROJECT NUMBER:	2010-029

SPECIFICATIONS FOR
APPLE TREE HOUSE - PHASE III - SITE IMPROVEMENTS
JERSEY CITY, NEW JERSEY

PROJECT NO. 2010-029

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APPLE TREE HOUSE - PHASE III - SITE IMPROVEMENTS MARCH/2015

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ABBREVIATIONS

Abbreviations of names of Associations, Institutes or Agencies used throughout the Contract Documents are as follows:

AASHTO or AASHO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGA	American Gas Association, Incorporated
AISC	American Institute of Steel Construction, Incorporated
ANSI or ASA	American National Standards Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
BOG&T	Bureau of Geology and Topography, State of New Jersey
CIPRA	Cast Iron Pipe Research Association
CISPI	Cast Iron Soil Pipe Institute
CRSI	Concrete Reinforcing Steel Institute
EIAJ	Electronic Industries Association of Japan
FED. SPEC.	Federal Specification
IEEE	Institute of Electrical and Electronics Engineer (Successor to AIEE and IRE)
NEMA	National Electrical Manufacturer's Association
NJDOT	New Jersey Department of Transportation
NJSS or SS	New Jersey State Highway Department, Standard Specifications for Road & Bridges Construction, 1983, as currently amended. Also called Standard Specifications
OSHA	Occupational Safety and Health Administration
UL	Underwriter's Laboratory

NOTICE TO BIDDERS

Sealed bid proposals will be received, opened and read in public by the Purchasing Agent at **394 Central Avenue, Second Floor, Jersey City, New Jersey 07307** on _____ 2015 at 11:00 A.M.

Prevailing time, or as soon thereafter as the matter can be reached, for the:

APPLE TREE HOUSE - PHASE III - SITE IMPROVEMENTS
JERSEY CITY, NEW JERSEY

Bidders are required to comply with the requirements of N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27. Full requirements of the Equal Employment Opportunity and Affirmative Action Programs are incorporated herein by reference and may be obtained with Proposal Form. Bidders are also required to comply with the requirements of P.L. 2004, c.57 (N.J.S.A. 52:32-44) which includes the requirement that contractors provide copies of their Business Registration Certificates issued by the New Jersey Department of the Treasury, as well as other provisions as listed in the Contract Documents.

Proposals **MUST BE ACCOMPANIED** by a Bid Bond or Certified Check, made payable to the City of Jersey City, in an amount equal to Ten (10%) Percent of the Bid.

Each Bidder shall submit with his proposal submittal item nos. one (1) through fifteen (15) listed in the Schedule of Submittals by Bidder on page 51 of the General Conditions.

Bids may be submitted in person, or may be sent by U.S. certified mail return receipt requested, or may be sent by private courier service. Mail bids to: Peter Folgado, Purchasing Agent, RPPO, QPA, Division of Purchasing, 394 Central Avenue, Second Floor, Jersey City, New Jersey 07307. Bids sent by mail must be received by the Purchasing Agent no later than 4:00 P.M. on the last City business day before the day of the bid reception. Bids sent by courier service must be delivered to the Purchasing Agent no later than 11:00 A.M. on the day of the bid reception. The City shall not be responsible for the loss, non-delivery or physical condition of bids sent by mail or courier service. Bids must be submitted individually in a sealed envelope addressed to the Purchasing Agent. Bid proposals must comply with specifications.

The Purchasing Agent reserves the right to reject any and all bids received, or portions thereof, if deemed to be in the best interest of the City to do so.

INFORMATION TO BIDDERS

1. INTENT OF CONTRACT DOCUMENTS:

Under these specifications and the contract which will be based thereon, it is proposed that the bidder shall furnish all materials, equipment, tools, labor and supervision necessary to complete the work upon which he bids in strict accordance with the plans and specifications.

The intent of the Contract Documents is to obtain a complete job, satisfactory to the Architect. It shall be understood that the bidder has satisfied himself as to the full requirements of the Contract Documents and has based his Proposal upon such understanding.

2. FAMILIARITY WITH WORK:

It is the obligation of the Bidder to ascertain for himself all the facts concerning conditions to be found at the location(s) of the Project including all physical characteristics above, and or below the surface of the ground; to fully examine the Plans, Proposal, Estimate of Quantities, to read the Specifications thoroughly and completely, to consider fully these and all other matters which can in any way affect the work under the Contract and to make the necessary investigations relating thereto, and he agrees to this obligation in the signing of the Contract. The City assumes no responsibility whatsoever with respect to ascertaining for the Contractor such facts concerning physical characteristics at the site(s) of the Project. The Contractor agrees that he will make no claim for additional payment or extension of time for completion of the work or any other concession because of any misinterpretation or misunderstanding of the Contract, on his part, or of any failure to fully acquaint himself with all conditions relating to the work.

3. PLANS AND SPECIFICATIONS:

The project shall be performed in strict accordance with the requirements of the Plans and Specifications, subject to addenda issued by the City in writing. The Plans and Specifications are intended to complement and supplement each other. Any work required by either of them and not by the other shall be performed as if denoted both ways. Should any work be required which is not denoted in the Specifications or on the Plans because of an obvious omission but which is nevertheless necessary for the proper performance of the Project, such work shall be performed as fully as if it were described and delineated.

4. INTERPRETATIONS OR ADDENDA:

Should a Bidder find discrepancies or omissions from the Plans, Specifications, or Contract Documents, or should he be in doubt as to their meaning, he should at once notify Brian F. Weller, Division Director in writing at 575 Route 440, Second Fl., Jersey City, New Jersey 07305. No oral interpretation will be made to any Bidder as to the meaning of the Contract Documents or any part thereof. Every request for such interpretation shall be in writing and to be given consideration, must be received at least ten (10) calendar days prior to the date fixed for the opening of bids, to allow the City to issue an addendum prior to the date fixed for the opening of bids. Any and all such interpretations and any supplemental instructions or addition of items will be in the form of written addenda to the specifications which, if issued, will be mailed by registered mail with return receipt requested to all prospective bidders (at the respective addresses furnished for such purpose).

All addendum so issued shall become part of the Contract Documents and shall be read immediately prior to the opening of the bids by the Purchasing Agent who shall give each bidder or his representative present an opportunity to withdraw his bid before any bids are opened. Any objection arising out of the addendum subsequent to the opening of bids will not be considered. Failure of any bidder to receive any such addendum or interpretation or to attend the reading of the bids shall not relieve such bidder from any obligation under his bid as submitted, including such addendum. The City will not be responsible for any other explanations or interpretations of the proposed documents.

5. SUBSURFACE CONDITIONS:

It is the obligation of the Bidder to make his own investigations of subsurface conditions prior to submitting the Proposal. Borings, test excavations and other subsurface investigations, if any, made by the City prior to the Construction of the Project, the records of which may be available to the bidders, are made for use only as a guide for design. Said borings, test excavations and other subsurface investigations are not warranted to show the actual subsurface conditions.

Any interpretations of the City's subsurface investigation records made by the bidder as to the types, characteristics, quantity and quality of any subsurface material or condition shall be at the sole risk of the bidder.

The Contractor agrees that he will make no claims against the City, if in carrying out the Project he finds that the actual conditions encountered do not conform to those indicated by said borings, test excavations and other subsurface investigations.

6. SUBMITTING PROPOSAL:

Each Bid must be submitted on the prescribed Proposal Form which shall not be removed from the Specifications. All entries must be in ink or typewritten. Bidders shall submit their Proposals in sealed envelopes. On the outside of the envelope shall be stated the name and address of the bidder and the name of the work as shown in the Notice to Bidders.

When the Proposal is made by an individual his Post Office Address shall be stated and he shall sign the Proposal: when made by a firm or partnership its name and Post Office Address shall be stated, and the Proposal shall be signed by one or more of the partners: when made by a corporation, its name and principal Post Office Address shall be stated and the Proposal shall be signed by an authorized official of the Corporation, with Corporate Seal affixed. Signatures shall be notarized in all cases. Proposals shall be delivered in person to the City Purchasing Agent at the time and place stated in the Notice to Bidders, and they will be publicly opened and read aloud on the date, place, and at the time set and stated in the Notice to Bidders.

Bids may be submitted in person, or may be sent by U.S. certified mail return receipt requested, or may be sent by private courier service. Mail bids to: Peter Folgado, Purchasing Agent, RPPO, QPA, 394 Central Avenue, Second Floor, Jersey City, New Jersey 07307. Bids sent by mail must be received by the Purchasing Agent no later than 4:00 P.M. on the last City business day before the day of the bid reception. Bids sent by courier service must be delivered to the Purchasing Agent no later than 11:00 A.M. on the day of the bid reception. The City shall not be responsible for the loss, non-delivery or physical condition of bids sent by mail or courier service. Bids must be submitted individually in a sealed envelope addressed to the Purchasing Agent. Bid proposals must comply with specifications.

7. BID DOCUMENTS:

The Bid Documents to be included in the sealed envelope with the Proposal shall include but not be limited to the following:

* 1. Proposal
* 2. Certificate of Experience of General Contractor
3. Certificate of Experience of Subcontractors listed on Page P-9, pursuant to N.J.S.A. 40A: 11-16
* 4. Plant and Equipment Questionnaire of General Contractor
5. Plant and Equipment Questionnaire of Subcontractors listed on Page P-9, pursuant to N.J.S.A. 40A: 11-16
6. Non-Collusion Affidavit
* 7. Corporation or Partnership Statement
* 8. Bid Guarantee
* 9. Consent of Surety
10. New Jersey Business Registration Certificates of General Contractor and all Subcontractors listed on Page P-9, pursuant to N.J.S.A. 40A:11-16
11. Equality Information on Substituted Items (if applicable)
* 12. Written acknowledgment of Addendum (if issued), pursuant to N.J.S.A. 40A:11-23.2(e)
13. Public Works Contractor Registration Certificates for bidder and all subcontractors named in bid proposal are required pursuant to N.J.S.A. 34:11-56.48 et seq.
14. Exhibit B: Mandatory Equal Employment Opportunity Language
15. Form MWB-3; Minority/Women Business Compliance Plan

Failure to include the bid documents listed immediately above that are marked with an asterisk (*) shall result in automatic rejection of the bid at the time of the bid reception.

The contractor/bidder and all subcontractors named in the bid proposal must be registered with the Department of Labor pursuant to the Public Works Contractor Registration Act, N.J.S.A. 34:11-56.48 eq seq., at the time the bid proposal is received, or the proposal will be determined to be non-responsive and will be rejected. Any non-listed subcontractor must be registered with the Department of Labor prior to physically starting work. A contractor desiring to register should contact the Contractor Registration Unit, Division of Wage and Hour Compliance, New Jersey Department of Labor, P.O. Box 389, Trenton, New Jersey 08625-0389, telephone no: (609) 292-9464, fax no: (609) 633-8591, e-mail: contreg@dol.state.nj.us, website: www.nj.gov/labor/lsse/lspubcon.html.

8. BID GUARANTEE:

Each proposal shall be accompanied by a Certified Check, Cashier's Check or Bid Bond in the amount of not less than 10% of the total amount bid in the Proposal, but in no case need the Certified Check, Cashier's Check or Bid Bond or any combination thereof exceed $20,000.00. No cash will be accepted. This Certified Check, Cashier's Check or Bid Bond is offered as evidence of good faith and as a guarantee that, if awarded the contract, the Bidder shall execute the Contract and Performance Bond in the full amount of the Contract.

The bidder's bond is offered as a guarantee, made by a surety company qualified and authorized to do business in the State of New Jersey and must be signed by an officer or agent of the surety company authorized to execute bid bonds on behalf of the surety company. Included with the bid bond must be such documents which indicate that the offer or agent is authorized to execute the bid bond. If a certified check is offered as a guarantee, it shall be made payable to the City of Jersey City.

9. CONSENT OF SURETY:

All bidders shall submit with their bids a certificate from an approved surety company, authorized to do business in the State of New Jersey, stating that it will provide the contractor with a performance bond on such sum as required. The successful bidder will be required to furnish a surety corporation bond in the amount of the contract conditioned for the faithful performance thereof.

10. WITHDRAWAL OF PROPOSAL:

A Proposal, after having been submitted, may be withdrawn by the Bidder on a given Project prior to the opening of any bid on that Project.

N.J.S.A. 40A:11-23.3 authorizes a bidder to request withdrawal of a public bid due to a mistake on the part of the bidder. A mistake is defined by N.J.S.A. 40A:11-2(42) as a clerical error that is an **unintentional and substantial computational error** or **an unintentional omission of a substantial quantity of labor, material, or both, from the final bid computation.**

A bidder claiming a mistake under N.J.S.A. 40A:11-23.3 must submit a request for withdrawal, **in writing**, by certified or registered mail to: Peter Folgado, Purchasing Agent, RPPO, QPA, 394 Central Avenue, Second Floor, Jersey City, New Jersey 07307. The bidder must request withdrawal of a bid due to a mistake, as defined by law, within five business days after the receipt and opening of the bids. Since the bid withdrawal request shall be effective as of the postmark of the certified or registered mailing, Peter Folgado, Director, Division of Purchasing may contact all bidders, after bids are opened, to ascertain if any bidders wish to, or already have exercised a request to withdraw their bid pursuant to N.J.S.A. 40A:11-23.3.

A bidder's request to withdraw the bid **shall** contain evidence, including any pertinent documents, demonstrating that a mistake was made. Such documents and relevant written information shall be reviewed and evaluated by the public owner's designated staff pursuant to the statutory criteria of N.J.S.A. 40A:11-23.3.

The City will not consider any written request for a bid withdrawal for a mistake, as defined by N.J.S.A. 40A:11-2(42), by the bidder in the preparation of a bid proposal unless the postmark of the certified or registered mailing is within the five business days following the opening of bids.

11. CAUSES FOR REJECTION:

Proposals from bidders who are found to be unqualified and Proposals not accompanied by all required and properly completed bid documents may be rejected.

In addition, causes for rejection of Proposals may include but not be limited to the following:

A. if prices are obviously unbalanced,
B. if received from Bidders who have previously performed work in an unsatisfactory manner,
C. if the Purchasing Agent, at his/her sole discretion, deems it advisable to do so in the best interest of the City of Jersey City,
D. if conditions, limitations or provisions are attached by a Bidder to his Proposal, if Proposals are otherwise irregular or if the enclosed or accompanying documents are not completed and properly executed,
E. if the bidder has not constructed at least three (3) comparable projects within the previous three (3) years,
F. if the bidder does not own sufficient or satisfactory equipment to perform the work.

12. RETURN OF BID GUARANTEES:

The Bid Guarantees of all except the apparent three (3) lowest responsible bidders on the project will be returned within ten (10) working days after the opening of bids. The bids of such bidders will be considered as officially withdrawn. Within three (3) working days after awarding the contract, and the approval of the contractor's Performance Bond, the bid guarantees of the remaining unsuccessful bidders will be returned.

Upon execution of the contract by the successful bidder and acceptance by the City of the Performance Bond, and the receipt of the certificate of insurance, the bid guarantee of the lowest bidder will be returned.

No interest will be paid on any form of bid guarantee.

13. AWARD OF CONTRACT:

The Contract, if awarded, will be awarded to the lowest responsible, qualified bidder whose Proposal complies with the requirements as stated herein. Proposals may be rejected where the prices as bid are obviously unreasonable. Award of the contract will be announced by the Municipal Council of the City of Jersey City. If the Total Price is found to have been incorrectly computed, change will be made in any and all unit prices so as to attain conformity with the Total Price before the award is made.

BID FOR UNIT PRICES CONTRACT:

The Bidder shall state on the Proposal Form the price per unit of measure for each scheduled item of work for which he will agree to carry out the work, and the total price for the performance of the Project, as determined by multiplying each estimated quantity by the price per unit of measure bid and adding together the resulting amounts. Unit prices shall be given in writing and in figures and in the case of variance the prices in writing shall prevail.

INFORMATION TO BIDDERS

BID FOR LUMP SUM CONTRACT:

Lump Sum Bid, Base Bid prices and Alternates shall be in figures and words. In case of discrepancy the amount described in words shall govern. If any of the alternates listed in the Proposal Form does not involve change in price, the Bidder shall so indicate by writing the words "no change' on the space provided.

If the Base Bid is within the amount of funds available to finance the construction contract and the City wishes to accept alternate bids, then contract award will be made to that responsible bidder submitting the low combined bid, consisting of the base bid plus alternate bids. Under this procedure, if the City wishes to make award on only the base bid, then contract award will be made to that responsible bidder submitting the low base bid.

For the purpose of comparison of bids received, the total price stated in the Proposal will be considered to be the amount bid for the Project and award will be made on that Total Price. The Purchasing Agent may consider informal any Bids not prepared and made in accordance with the provisions stated herein and may waive or reject any or all bids. Bids containing any conditions, omissions, unexplained erasure or alterations, or items not called for in the proposal, or irregularities of any kind may be rejected by the City.

The Purchasing Agent will either award the Contract or reject all Proposals received within sixty (60) days after the formal opening of Proposals. The acceptance of a Proposal will be a notice in writing signed by the Purchasing Agent and no other act shall constitute the acceptance of a Proposal.

14. TIME FOR EXECUTING CONTRACT & LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT:

Any bidder whose Proposal is accepted will be required to execute four (4) copies of the Contract and furnish satisfactory bond, and insurance certificate to the City of Jersey City within ten (10) days after notice of acceptance.

The successful bidder, upon his failure or refusal to execute and deliver the signed contract, bonds and certificate of insurance required within ten (10) days after receipt of contracts shall forfeit the certified check, cashier's check or bid bond to the City as liquidated damages for such failure or refusal.

The damages to the City of Jersey City for breach as above provided will include loss from interference with its construction program and other items whose accurate amount will be difficult or impossible to compute. The amount of the Bid Guarantee accompanying the proposal of such Bidder shall be retained by the City of Jersey City, not as a penalty, but as liquidated damages for such breach. In the event any bidder whose proposal has been accepted shall fail, refuse or resist to execute the contract as hereinbefore provided, the Municipal Council of the City of Jersey City may, as their option, determine that such Bidder has abandoned the Contract and thereupon his proposal and the acceptance thereof shall be null and void, and the City shall be entitled to liquidated damages as above provided.

The rights and obligations provided for in the Contract shall become effective and binding upon the parties only with its formal execution by the City of Jersey City. Any work started or materials delivered prior to said execution of contract shall be at the Contractor's risk.

15. PERFORMANCE BOND:

Within ten (10) days of the date of award of the Contract, the Bidder to whom the Contract has been awarded shall furnish and deliver Surety Corporation Bond, conditioned for the faithful performance and completion of the work, and for the payment of all lawful claims and bills against the contractor for all labor, material, tools and equipment used in or in connection therewith. The Bond shall not be returned or canceled until all liability to any and all persons protected by the conditions of said Bond shall have been met by the Contractor or person primarily liable for the payment thereof, or by the Surety on said Bond.

The Bond required for the faithful performance of the Contract shall be in such sum equal to one hundred percent (100%) of the total amount of the contract, shall be satisfactory to the Corporation Counsel of the City of Jersey City shall be executed by a Surety Company licensed to do business in the State of New Jersey, and shall comply with N.J.S.A. 2A: 44-143 to 147 and amendments thereof and supplements thereto. In no case shall the contractor begin work prior to approval of said bond by the City.

16. CERTIFICATE OF INSURANCE:

The contractor shall also supply to the City, at the time the Contract is signed, Certificate of Insurance in such amounts as described elsewhere in these specifications, which will be maintained by the contractor during the life of the contract. The City of Jersey City shall be named as co-insured on Certificate/Policy.

17. ESTIMATES QUANTITIES AND UNIT PRICES:

The Unit Price bid in each of the items included in the Proposal shall cover all costs of whatever nature, incidental to the work. In explanation but not in limitation thereof, these costs shall include the cost of all work, labor, material, equipment, transportation and all else necessary to perform and complete the Project in the manner and within the time required, and all incidental expenses in connection therewith, all costs on account of loss by damage or destruction encountered for settlement of damages, and for replacement of defective work and materials.

The Estimate of Quantities specified covering all work to be done and materials to be furnished is approximate only and is given solely to be used as a uniform basis for comparison of bids. The Architect reserves the right to increase or diminish any or all quantities, or to omit any, if it is deemed necessary to do so.

If any part is so withdrawn by the City, the contractor shall have no claim for loss incurred by him for commitments made by him in anticipation of the work contemplated, or for loss of anticipated profits, or for work done prior to his having been authorized to proceed therewith.

18. LUMP SUM PRICE:

The Lump Sum Price in the Proposal shall cover all costs of whatever nature, incident to and growing out of the work. In explanation but not in limitation thereof, these costs shall include the cost of all work, labor, material, equipment, transportation, and all else necessary to perform and complete the Project in the manner and within the time required, and all incidental expenses for unforeseen difficulties encountered for settlement of damages, and for replacement of defective work and materials.

19. CHANGES - EXTRA WORK FOR UNIT PRICE CONTRACT:

The City may at any time desire changes in either the quantity or the quality of Work or materials to be performed or furnished. These changes may be such as to either reduce or to increase quantities specified or may call for Extra Work or materials not contemplated in the original Schedule of Prices in the Proposal.

The City may make changes in the Work required to be performed by the Contractor under the Contract by making additions thereto, or by omitting Work therefrom, without invalidating the Contract, and without relieving or releasing the Contractor from any of his obligations under the Contract or any Bonds given by him pursuant to the Contract provisions, and without relieving or releasing the Surety or Sureties of said Bonds. All such changes in the Work will be authorized by written Change Order, the Total Contract Price and the Contract Time being adjusted accordingly; and shall be executed under the terms of the original Contract unless it is expressly provided otherwise. The Change Orders shall be limited to the following types:

A. Emergency occurrence affecting health, safety or welfare.
B. Unforeseeable problems.
C. Minor modifications to effect economics, improve service or resolve minor problems with affected property owners.

When the Extra Work to be performed is of a kind not embraced in the Proposal or being so embraced is to be done at a lesser or greater price or quantity than originally agreed upon, the Contractor shall be furnished a written Change Order signed by the City and approved by the City Council. Said Change Order shall state the Extra Work to be done, the amount to be paid therefor, and the number of additional days, if any, that will be added to the time specified for the completion of the entire Project covered by this Contract.

The price stated in this written Change Order representing the sum to be added to or deducted from the Total Contract Price shall be determined as follows:

(1) By such applicable Unit Prices, if any, as are set forth in the Contract; or
(2) If no such Unit Prices are set forth, then by a Lump Sum mutually agreed upon by the City and the Contractor; or
(3) If no such Unit Prices are so set forth and if the parties cannot agree upon a Lump Sum then by the actual net cost in money to the Contractor of:
    a. The wages of applied labor, including foreman, required for such Extra Work. Labor rates shall be as per current New Jersey Department of Labor Prevailing Wage Rates plus thirty-four (34%) percent of the Prevailing Wage Rate for other direct cost of labor to the Contractor, which includes taxes (eg. FICA, FUTA,

SUTA, SDI, etc.), insurance premiums (Workmen's Compensation Insurance, General Liability, etc.), bond premiums (Performance and Payment Bonds, etc.), plus benefits listed in the Prevailing Wage Rates;

b. Plus the materials entering permanently into such Extra Work;

c. Plus such rental for plant and equipment (other than small tools) required and approved for such Extra Work. The Contractor's hourly equipment rates shall be as per the monthly rates divided by 176 in the current "Blue Book" published by Nielsen/DATAQUEST. The weekly, hourly and daily rates will not be used.

d. Plus power and consumable supplies for the operation of power equipment required for such Extra Work;

e. Plus fifteen (15%) percent of a, b, c and d above as compensation for all other items and profits, and costs or expenses including administration, overhead, superintendence, materials used in temporary structures, allowances made by the Contractor to the Subcontractors, the use of small tools and any other general expenses. The Contractor's compensation for overhead and profit shall be limited to five (5%) percent on Work performed by a Subcontractor. All time and material quantities shall be verified by the City on a daily basis.

When Extra Work is performed under Method 3, the Contractor shall furnish satisfactory bills, certified payrolls and vouchers covering all items of cost, and when required, shall give the City access to accounts relating thereto.

The provisions hereof shall not affect the power of the Contractor to act in case of emergency, as hereinafter provided. Under no circumstances shall the Contractor perform Work in excess of the quantities delineated in the Proposal without a written Change Order issued by the City. The City shall not be liable for any claims for Work performed outside the Contract unless so authorized by a written Change Order.

It is understood and agreed to by the Bidder that any delays necessary to institute a Change Order, resolved by the City Council, shall not be a basis for claims for additional compensation. Wherever possible the Contractor shall mobilize his forces to construct another portion of the Project while awaiting said written Change Order.

20. CHANGES - EXTRA WORK FOR LUMP SUM CONTRACT:

The City, through the City, may at any time desire changes in either the quantity or the quality of Work or materials to be performed or furnished. These changes may be such as to either reduce or to increase quantities specified or may call for Extra Work or materials not contemplated in the original Schedule of Prices in the Proposal.

The City, through the City, may make changes in the Work required to be performed by the Contractor under the Contract by making additions thereto, or by omitting Work therefrom, without invalidating the Contract, and without relieving or releasing the Contractor from any of his obligations under the Contract or any Bonds given by him pursuant to the Contract provisions, and without relieving or releasing the Surety or Sureties of said Bonds. All such changes in the Work will be authorized by written Change Order, the Total Contract Price and the Contract Time being adjusted accordingly; and shall be executed under the terms of the original Contract unless it is expressly provided otherwise. The Change Orders shall be limited to the following types:

A. Emergency occurrence affecting health, safety or welfare.
B. Unforeseeable problems.
C. Minor modifications to effect economics, improve service or resolve minor problems with affected property owners.

When the Extra Work to be performed is of a kind not embraced in the Proposal or being so embraced is to be done at a lesser or greater price or quantity than originally agreed upon, the Contractor shall be furnished a written Change Order signed by the City and approved by the City Council. Said Change Order shall state the Extra Work to be done, the amount to be paid therefor, and the number of additional days, if any, that will be added to the time specified for the completion of the entire Project covered by this Contract.

The price stated in this written Change Order representing the sum to be added to or deducted from the Total Contract Price shall be determined as follows:

1. By such applicable Unit Prices, if any, as are set forth in the Contract; or
2. If no such Unit Prices are set forth, then by a Lump Sum mutually agreed upon by the City and the Contractor; or
3. If no such Unit Prices are so set forth and if the parties cannot agree upon a Lump Sum then by the actual net cost in money to the Contractor of:

    a. The wages of applied labor, including foreman, required for such Extra Work. Labor rates shall be as per current New Jersey Department of Labor Prevailing Wage Rates plus thirty-four (34%) percent of the Prevailing Wage Rate for other direct cost of labor to the Contractor, which includes taxes (eg. FICA, FUTA, SUTA, SDI, etc.), insurance premiums (Workmen's Compensation Insurance, General Liability, etc.), bond premiums (Performance and Payment Bonds, etc.), plus benefits listed in the Prevailing Wage Rates;
    b. Plus the materials entering permanently into such Extra Work;
    c. Plus such rental for plant and equipment (other than small tools) required and approved for such Extra Work. The Contractor's hourly equipment rates shall be as per the monthly rates divided by 176 in the current "Blue Book" published by Nielsen/DATAQUEST. The weekly, hourly and daily rates will not be used.
    d. Plus power and consumable supplies for the operation of power equipment required for such Extra Work;
    e. Plus fifteen (15%) percent of a, b, c and d above as compensation for all other items and profits, and costs or expenses including administration, overhead, superintendence, materials used in temporary structures, allowances made by the Contractor to the Subcontractors, the use of small tools and any other general expenses. The Contractor's compensation for overhead and profit shall be limited to five (5%) percent on Work performed by a Subcontractor. All time and material quantities shall be verified by the City on a daily basis.

When Extra Work is performed under Method 3, the Contractor shall furnish satisfactory bills, certified payrolls and vouchers covering all items of cost, and when required, shall give the City access to accounts relating thereto.

The provisions hereof shall not affect the power of the Contractor to act in case of emergency, as hereinafter provided. Under no circumstances shall the Contractor perform Work in excess of the quantities delineated in the Proposal without a written Change Order issued by the City. The City shall not be liable for any claims for Work performed outside the Contract unless so authorized by a written Change Order.

It is understood and agreed to by the Bidder that any delays necessary to institute a Change Order, resolved by the City Council, shall not be a basis for claims for additional compensation. Wherever possible the Contractor shall mobilize his forces to construct another portion of the Project while awaiting said written Change Order.

21. SUBSTITUTIONS:

Each Bidder represents that his Proposal is based upon the materials and equipment described in the bidding documents.

Where materials are specified by a trade name or manufacturer's model or catalog number, the name product shall be construed to read "or equivalent". If a bidder substitutes any material other than those named in the Specifications, such material shall be equivalent in all respects to the named products specified. The burden of submitting adequate information to prove equivalency of substituted materials shall be the responsibility of the Contractor. All information necessary to prove equivalency of substituted materials should be included with the proposal submitted at the bid reception. Proposed substitutions shall satisfy all design conditions including performance and physical properties which will be reviewed prior to approving the substitute; physical dimensions, pattern, colors, weight effect on other trades, availability, cost, performance and test data, guarantee and other properties. Where a Contractor substitutes materials, he shall submit two (2) samples of materials specified and two (2) samples of material considered by contractor to be an equivalent, along with technical information on each. Where a Contractor's information on a product is insufficient to determine "equivalency", laboratory tests will be required. A private laboratory will be selected by the Architect to conduct the test, the cost of which will be paid by the Contractor regardless of the test result. All modifications to existing work or to adjoining work, which are necessary to accommodate any item offered as an equivalent, shall be performed at no additional cost to the City. The Contractor shall substantiate in writing, by economic analysis, that items offered as equivalents will cause no addition in maintenance, fuel, or utility cost over the items shown or specified and have an equal life expectancy.

If after review of all submitted material, the substitution is deemed not an equivalent, the bid will be rejected.

All materials, equipment and assemblies shall be accompanied by manufacturer's instructions pertaining to installation, use and maintenance, as applicable, so as to be suitable for the intended purpose or service in the proposed methods of construction. All materials shall be used in strict accordance with manufacturer's instruction, which will include instructions for appropriate reconditioning of existing or previously applied materials in a manner that will provide conditions to ensure satisfactory completed Work.

22. INTENT OF PLANS AND SPECIFICATIONS:

It is the intent of these contract documents to detail a complete job and to specify the work to be accomplished. The plans and specifications are complementary and what is called for by one shall be binding as if called for by both.

Interpretation of the drawings and specifications shall be given preference in the following order:

1. Addenda to the specifications and/or drawings, (later dates to take precedence over earlier dates).

2. Specifications

3. Contract drawings (notes on drawings to take precedence over other data on drawings).

In case the Contractor finds the specifications or plans are not sufficiently clear or complete, he shall request the Architect to provide supplementary plans and specifications and the Architect will provide such additional information as may be necessary. Such request shall be made in writing at least two weeks prior to the time such drawings and specifications are to be needed, and no delay caused by the tardiness of the Architect, in supplying such information, shall be considered as neglect or default on his part unless written application shall have been so made.

The Architect shall have the authority to resolve any controversy as to the meaning and intent of these plans and specifications and he shall have the right to correct any errors or omissions therein for the proper completion of the project.

The Contractor shall also keep at least one set of the plans and specifications on the job site(s) at all times.

23. RESPONSIBILITY OF WORK:

The Contractor assumes full responsibility for materials and equipment employed in the construction of the Project and agrees to make no claim against the City of Jersey City for damages to such materials and equipment from any cause whatsoever. Until its final acceptance, the Contractor shall be responsible for damage to or destruction of the Project, or to any part thereof, due to any cause whatsoever.

The provisions of the foregoing paragraph shall not be a waiver of the Contractor's guarantee to replace defective work and materials during the maintenance period after date of acceptance.

The Contractor shall make good all work damaged or destroyed before the final acceptance of the Project and the cost thereof shall be included in the prices bid for the various items scheduled in the Proposal.

24. LAWS, ORDINANCES, REGULATIONS & PERMITS:

The successful bidder must secure all permits, insurance, licenses and pay any inspection in accordance with provisions as set forth in laws, ordinances, and regulations by all governmental agencies affecting the work at his own expense. The successful bidder shall be solely responsible for any damage resulting from his neglect to obey all laws, regulations, rules, and ordinances. Ignorance regarding such requirements shall in no way serve to modify the provisions of the contract.

The Contractor shall keep fully informed of all Federal and State laws, all local laws, ordinances, safety codes, regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the work. He shall at all times observe and comply with all such laws, ordinances, safety code, regulations, order, or decree, whether by himself or his employees.

The Contractor shall, at his own expense, secure and pay to the appropriate department of the City of Jersey City, the fees or charges for all permits for street pavement, sidewalks, sheds, removal of abandoned water taps, sealing of house connection drains, pavement cuts, buildings, electrical, plumbing, water, gas and sewer permits required by the City of Jersey City and any of its agencies.

The Contractor shall comply with applicable City laws and ordinances governing the disposal of surplus excavation materials, debris and rubbish on or off the Project Area and commit no trespass on any public or private property in any operation due to or connected with the work embraced in this Contract.

25. PROVISIONS REQUIRED BY LAW DEEMED INSERTED:

Each and every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein and the contract shall be read and enforced as though it were included herein and if, through mistake or otherwise any such provision is not correctly inserted, then upon the application of either party, the contract shall forthwith be physically amended to correct such insertion.

26. INSURANCE:

Certificates of liability and Workmen's Compensation Insurance satisfactory to the City shall be filed with the City at the time the contract is signed. All of the contractor's insurance coverage shall contain a clause indemnifying and saving harmless the City of Jersey City and its other agents from any and all liability of whatever nature arising from the work to be performed under the contract, including attorney's fees and costs in connection with the defense of such claims. The certificate of insurance furnished by the contractor shall spell out specifically that the above indemnification is guaranteed by the policy.

The Contractor shall not commence work under the Contract or under any special condition until he has obtained all insurance as required under the following sub-paragraphs, and until such insurances have been approved by the City, nor shall the Contractor allow any subcontractor to commence work on his subcontract until all similar insurances required of the subcontractor have been obtained and approved.

INFORMATION TO BIDDERS

The Contractor shall take out and maintain, during the life of this Contract, Workmen's Compensation Insurance for all its employees at the site of the project and, incase any work is sublet, the Contractor shall require the Subcontractor similarly to provide Workmen's Compensation Insurance for all the latter's employees unless such employees are covered by the protection afforded by the Contractor. In case any class of employees engaged in hazardous work under this Contract at the site of the Project is not protected under Workmen's Compensation Statutes, the Contractor shall provide, and shall cause each Subcontractor to provide Compensation Insurance with a private company in an amount equivalent to that provided by the Workmen's Compensation Statutes for the protection of his employees not otherwise protected.

The Contractor shall obtain and keep in force during the term of the Contract, General Liability and Property Damage Insurance in companies and in form to be approved by the City. Said insurance shall provide coverage to the Contractor, any Subcontractor performing work provided by this Contract, and the City. The City of Jersey City, its officers, agents, servants, and employees as their interest may appear, shall be named as an additional insured on said policy insofar as the work and obligations performed under the Contract are concerned. The coverage so provided shall protect against claims for personal injuries, including accidental death, as well as claims for property damages, which may arise from any act or omission of the City, the Contractor or the Subcontractor or by anyone directly or indirectly employed by either of them.

The minimum policy limits of such insurance shall be as follows:

A. General Liability and Property Damage Insurance:

In an amount not less than $1,000,000 for injuries, including wrongful death, to any one person, and subject to the same limit for each person, and an amount of not less than $2,000,000 on account of one accident, and property damage insurance in an amount of not less than $100,000 for each accident, and for an aggregate limit of not less than $300,000. This insurance shall be written with an acceptable company authorized to do business in the State of New Jersey, shall be taken out before any operations of the Contractor are commenced, and shall be kept in effect until all operations shall be satisfactorily completed.

B. Special Hazards Insurance:

The following special hazards shall be covered during the life of this Contract by rider or riders to the policy or policies above required or by separate policies of insurance: (A) blasting and explosion; (b) collapse of or structural injury to any structure or facility due to (1) excavation or pumping, (2) shoring or demolition of any structure or the removal or rebuilding of any structural support thereof; (c) all vehicles and equipment; (d) the term "caused by accident" in the standard policy shall be broadened by the inclusion of the term "occurrence". This policy shall contain a broad form contractual coverage endorsement.

C. Automobile Insurance:
(a) Automobile Liability Insurance to cover each automobile, truck, vehicle or other equipment used in the performance of the Contract in an amount not less than $1,000,000 on account of injury or death of one person and not less than $2,000,000 on account of

injury or death of two or more persons; (b) Property Damage Liability Insurance to cover each automobile, truck, vehicle or other equipment used in performance of the Contract in an amount not less than $100,000 in any accident.

D. Workers' Compensation:

_____Workers' Compensation coverage with NJ statutory limits and including Employer's Liability limits of no less then $1,000,000.

E. Builders Risk Insurance:
Coverage shall be in an amount equal to the full value of the material cost to adequately protect the Contractor and the City from all risks resulting in damage to the property.

F. Notice of Change:
Each and every insurance policy required by the terms of this Contract shall carry endorsement to the effect that the insurance company will give at least thirty days notice to the City of any modification or cancellation of any policy or policies.

27. INDEMNITY:

The Contractor agrees to save the City of Jersey City, its officers, agents, servants, and employees as their interest may appear, harmless from all loss or damage occasioned to it or to any third person or property by reason of any carelessness or negligence on the part of the City, the Contractor, Subcontractors, agents, and employees in the performance of the Contract and will, after reasonable notice thereof, defend and pay the expense of defending any suit which may be commenced against the City of Jersey City, its officers, agents, servants and employees as their interest may appear, by any third person alleging injury by reason of such carelessness or negligence, and will pay any judgement which may be obtained against the City of Jersey City, its officers, agents, servants, and employees as their interest may appear, in such suit.

The cost of such indemnification shall be included in the prices bid for the various scheduled items in the Proposal. So much money due to the Contractor under and by virtue of the Contract as shall be considered necessary by the City may be retained by the City and held until such suits, actions, claims or amounts shall have been settled and suitable evidence to that effect furnished to the City.

28. SUBMISSION OF POST-BID INFORMATION:

Upon request by the Architect, the selected Bidder shall within seven (7) days thereafter submit the following:

A. A statement of costs for each major item of work included in the Proposal.

B. A designation of the work to be performed by the Bidder with his own forces.

C. A list of names of the subcontractors or other persons or organizations (including those who are to furnish materials or equipment fabricated to a special design) proposed for such portions of the work as may be designated in the bidding documents or, if no portions are so designated, the names of the subcontractors proposed for the principal portions of the work.

The bidder will be required to establish to the satisfaction of the Architect the reliability and responsibility of the proposed Subcontractors to furnish and perform the work described in the sections of the Specifications pertaining to such proposed Subcontractor's respective trades. Prior to the award of the Contract, the Architect will notify the bidder in writing if the Architect after due investigation, has reasonable and substantial objection to any person or organization or such list. If the Architect has a reasonable and substantial objection to any person or organization on such list, and refuses in writing to accept such person or organization, the Bidder shall obtain another Subcontractor satisfactory to the Architect at no additional cost to the contract.

GENERAL CONDITIONS

GC-1 PUBLIC SAFETY AND CONVENIENCE:

The Contractor shall conduct his work with the least possible obstruction to traffic. The convenience of the public and of the residents adjacent to the Project, and the protection of persons and property, are of first importance and shall be provided for by the Contractor in an adequate and satisfactory manner. Adequate temporary crossings shall be constructed and maintained where access to adjacent property is desired, the fire hydrants shall be kept accessible.

Trucks hauling materials shall have tight tail gates and shall be loaded with adequate freeboard of not less than three (3) inches without precarious cones or piles of material.

The Contractor shall provide for prompt removal from existing roadways of all dirt and other materials that have been spilled, washed, tracked or otherwise deposited thereon by his hauling and other operations whenever the accumulation is sufficient to cause the formation of mud, interfere with drainage, damage pavements or create a traffic hazard.

The Contractor shall employ construction methods and means that will keep flying dust to the minimum. He shall provide for the laying of dust retardants on the Project, and on roads, streets and other areas immediately adjacent to the Project limits, wherever traffic, or buildings that are occupied or in use, are affected by such dust caused by his hauling or other operations. The materials and methods used for retardant laying shall be subject to the approval of the Engineer. The cost of carrying out the foregoing provisions shall be included in the prices bid for the various items scheduled in the Proposal.

The Contractor shall conduct his operations in such a manner as to provide maximum safety for all employees on the work and the public as well. He shall comply promptly with such safety regulations as may be prescribed by the Engineer and shall, when so directed by the Engineer of his duly authorized agents, properly correct any unsafe conditions created by or unsafe practices on part of his employees. In the event of the Contractor's failure to comply, the Engineer may take the necessary measures to correct the conditions or practices and all costs thereof will be deducted from any monies due the Contractor. Failure of the Engineer to direct the correction of unsafe conditions or practices shall not relieve the Contractor of his responsibility herein.

GC-2 FAILURE TO MAINTAIN STREETS IN SAFE CONDITION:

In the event that the Contractor fails to maintain trenches and roads in a safe and passable condition following pipe laying or fails to clean up or fails to install and maintain pavement replacement over trenches, the City shall have the right to order this work done by others at the cost and expense of the Contractor. The Contractor will be given notice of the unsatisfactory condition. After such notice is submitted to the Contractor, the City may order this work done and deduct the cost of same from payment due under this contract.

GC-3 ACCIDENT PREVENTION:

Precaution shall be exercised at all times for the protection of persons and property. The safety provisions of applicable laws, building and construction codes, and the rules and regulations of U. S. Occupational Safety & Health Administration (OSHA), shall be observed. Machinery, equipment and other hazards of whatsoever character shall be guarded in accordance with the safety provisions of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America, to the extent that such provisions are not inconsistent with applicable Federal, State and City laws and regulations.

If any operation, practice or condition during the course of the work be deemed by the Engineer to be unsafe, the Contractor shall take corrective action when notified in writing by the Engineer. However, where in the opinion of the Engineer, any operation, practice or condition endangers persons or property, it shall be discontinued and adequate remedial action taken before the affected part of the work is resumed.

Nothing in the foregoing paragraphs shall be construed as relieving the Contractor from full responsibility for safe prosecution of the work at all times.

GC-4 PROPERTY DAMAGE:

The Contractor shall protect all property, monuments, trees, existing structures, utilities and work of any kind along and adjacent to the work under this contract against damage or interruption of service. Damage, injury, loss, or interruption of service resulting from the failure to do so shall be repaired or restored promptly by the contractor at his own expense.

The Contractor shall shore up, brace, underpin, secure, and protect as may be necessary, all foundations and other parts of existing structures adjacent to, adjoining, and in the vicinity to the site, which may be in any way affected by the excavations or other operations connected with the construction or reconstruction of the work embraced in this contract.

The Contractor shall not enter on or make use of private property in the prosecution of the Project unless written permission therefor is secured in duplicate, from the owner, one copy of which shall be filed with the Engineer. He shall promptly restore or repair, without cost to the City and in a manner satisfactory to its owner, property damaged or destroyed by his operations. Special attention shall be given to the protection of existing landscape features and vegetation.

GC-5 PUBLIC UTILITIES & UNDERGROUND FACILITIES:

The terms public utility or public utilities used in this Article shall be construed to include those publicly and privately owned.

It shall be the Contractor's responsibility to notify in writing all the various utility companies concerned prior to the initial start of construction, so that they will have sufficient time to locate, relocate or construct their facilities. He shall also be responsible for the location of all other underground lines and appurtenances such as existing sanitary sewers and house connections,

existing water and gas lines, existing storm drains, etc., whether such underground lines and appurtenances are noted or not noted on the plans, so as to prevent any direct interference with underground lines being constructed.

The Contractor is responsible for coordinating said work with the utility companies so as not to disrupt the progress of the job nor the workmanship of said improvement. All existing utilities are to be located and adjusted by the various utilities concerned. All the utilities have been located on the drawings by the Engineer as designated by the utility companies. The Engineer does not assume responsibility for said locations. The contractor must have the utility companies verify said locations.

The Contractor shall at his own expense properly support and maintain all public utility structures and facilities together with all other existing underground lines and appurtenances he may encounter in connection with the work, and shall replace any street signs, stop signs, bus station signs, etc., which may have to be removed temporarily and replace or repair any he may damage. The Contractor is cautioned to insure the safety of all persons with reference to overhead power lines.

Should the Contractor in course of the construction work cause any damage to the existing underground lines and appurtenances, he shall at his own expense restore or repair the damaged lines.

The Contractor shall carry out his work carefully and skillfully and shall support and secure public utility structures so as to avoid damage to them. Flow in drains and sewers shall be satisfactorily maintained. He shall not move without the owner's written consent any public utility structures, and at the completion of the work their condition shall be as safe and permanent as before. When public utility structures, facilities or equipment are damaged by the Contractor, he shall notify their owners, who may cause the damage to be repaired at the Contractor's expense. If the cost thereof is not paid by the Contractor within 30 days after repairs have been completed, the City may retain an amount sufficient to cover the cost from any moneys due or that may become due the Contractor under this Contract. House service connections damaged by the Contractor shall be repaired by competent skilled mechanics.

When the removal, relocation or replacement of public utility structures or facilities is not deemed essential by the Engineer for carrying out the Project as planned, but is performed for the Contractor's convenience, the cost of such work shall be included in the prices bid for the various items scheduled in the Proposal. When such removal, relocation or replacement is deemed essential by the Engineer for carrying out the work of the Project as planned, the cost shall be borne by the City or by the owner of the utility in accordance with City policy.

Due notice will be given to all interested parties in accordance with N.J.S.A., that all surface openings within the site of the Project shall be made prior to the laying of the finished pavement.

GC-6 MAINTENANCE AND PROTECTION OF TRAFFIC:

All roadways within the limits of the project which are reserved for traffic shall be maintained by the Contractor free from obstruction and in a smooth riding condition at all times.

The Contractor shall always provide a safe driveway and/or walkway for the use of traffic and/or pedestrians to and from properties along the street. Such passageways shall be adequately maintained and provided with adequate signs, barricades, lights and watchmen.

In streets and roadways the contractor will be responsible for the maintenance of traffic with a minimum of one lane open at all times. Where necessary, steel plates shall be employed to provide for the maintenance of traffic as directed by the Engineer. Under no circumstances will a street or roadway be completely closed to traffic without permission from the Engineer; and the Contractor, upon receiving permission from the Engineer; shall notify the Police, Fire and Public Works Department of such closing.

The Contractor shall supply, erect, place and maintain in good and upright condition during the course of the work, barricades, warning signs, lights, flares, approved flashing electric flasher units, rubber traffic cones, and other warning and danger signals and devices, appropriate and adequate for the specific needs and subject to the Engineer's approval, at working sites, closed roads, intersections, open excavations, locations of material storage, standing equipment, and other obstructions, at points where the usable traffic width of the road is reduced, at points where traffic is deflected from its normal courses or lanes, and at other places of danger to vehicular or pedestrian traffic or to the completed work.

Signs, barricades, traffic cones, flares and electric flasher units shall be established, relocated, repaired and replaced in such a manner and at such times and places as may be necessary for adequate protection of vehicular and pedestrian traffic, subject to approval by the Engineer.

The Contractor shall provide sufficient watchmen and traffic directors and shall take all other precautions, including any which may be ordered by the Engineer, that may be necessary for the safety of the public and protection of the work.

When detours are required due to the construction, such detours shall be established with the approval of the Police Department in advance, and the Contractor at his own expense shall furnish, erect and maintain barricades as specified above to close the street or highway and protect traffic and his work at the beginning and end of the detour.

The Contractor shall take all precautions, including any which may be ordered by the Engineer, that may be necessary for the safety of the public and the protection of the work during night time hours, with adequate patrolling during this period and replace missing flares and other lighting units.

Where traffic is to be maintained on main thoroughfares, the Contractor shall provide approved metal plates to cover open trenches, as directed by the Engineer. All signs and barricades shall conform to current specifications set forth in the "Manual on Uniform Traffic Control Devices for Streets and Highways", U.S. Department of Transportation, Federal Highway Administration, as currently amended.

The cost of Maintenance and Protection of Highway or Street Traffic as described above will not be paid for under any specific item, but the cost thereof shall be included in the prices bid for the various items scheduled in the Proposal.

GC-7 OTHER CONTRACTORS:

The right is reserved by the city to do work with its own employees or with the use of contractors and to permit public utility companies and others to do work during the progress of the project within the limits thereof or adjacent thereto. The Contractor shall conduct his work and cooperate with such utility companies and others so as to cause as little interference as possible with their work, as the Engineer may direct. The Contractor shall allow other contractors and utility companies and their agents access to their work within the site of the Project. The Contractor shall and hereby does agree, to make no claims against the City for additional payment due to delays or other conditions created by the operations of such other parties. If there be a difference of opinion as to the respective rights of the Contractor and others doing work within the limits of or adjacent to the Project, the Engineer will decide as to the respective rights of the various parties involved in order to secure the completion of the City's work in general harmony and in a satisfactory manner.
His decision shall be final and binding on, and shall not be cause for claims by the Contractor.

The Contractor will be held responsible for any damage done or caused by his work or forces to the work performed by other Contractors or utility companies within or adjacent to the site of the Project, and he shall repair or make good any such damage in a manner satisfactory to the Engineer and without cost to the City.

GC-8 EXISTING MONUMENTS:

Existing monuments and title stones which need not be removed shall be left in place and protected by the Contractor against damage and dislocation. When relocation or change in the grade of existing monuments is necessary, they shall be protected in their original position until their removal is approved by the Engineer, and shall be reset when directed and in conformance with the new lines and grades to be furnished, by him. Monuments and title stones, that are to be left in place or reset and are removed without approval of the Engineer shall be replaced at the Contractor's expense. The cost of resetting monuments shall be included in the base bid.

GC-9 PATENTS:

The Contractor shall hold and save the City of Jersey City, its officers, and employees, harmless from liability of any nature or kind, including costs and expenses, for, or an account of, any patented or unpatented invention, process, article, or appliance manufactured or used in the performance of the Contract, including its use by the City, unless otherwise specifically stipulated in the Technical Specifications.

GC-10 CONTRACT AND CONTRACT DOCUMENTS:

The Plans, Bid Specifications, Technical Specifications and Addenda, if any, shall form part of the contract, and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth. The table of contents, titles, headings, running headlines and marginal notes contained herein and in said documents are solely to facilitate reference to various provisions of the contract documents and in no way affect limit, or cast light on the interpretation of the provisions to which they refer. The organization of the Specifications into divisions, sections and articles, and the

arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

Anything mentioned in the Technical Specifications and not shown on Drawings, or shown on the Drawings and not mentioned in the Technical Specifications, shall be of like effect as if shown on or mentioned in both. In case of difference between Drawings and Technical Specifications, the Technical Specifications shall govern. In case of any discrepancy in Drawings, or Technical Specifications, the matter shall be immediately submitted to the Engineer, for a decision.

The figured dimensions on the Drawings or notes indicating dimensions shall be used instead of measurements of the Drawings by scale, and shall be strictly complied with. No scale measurements shall be used as a dimension to work with except on large scale drawings not dimensioned. In case of difference between small and large scale drawings, the large scale drawings shall govern.

GC-11 CONTRACTOR'S ORGANIZATION & EQUIPMENT:

Methods and Equipment. The Contractor shall at all times employ competent supervision, labor and adequate equipment for prosecuting the several classes of work to full completion in the manner and time required by these Specifications.

All workmen shall have sufficient skill and experience to perform properly the work assigned to them. Workmen engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform the work satisfactorily.

Should the Contractor fail to remove any employee from work when requested or fail to furnish suitable and sufficient personnel and equipment for the proper prosecution of the work, the Engineer may suspend the work by written notice until compliance with such order.

The Contractor shall be responsible for the proper fitting of all work and for the coordination of the operations of all trades, subcontractors, or material men engaged upon this Contract. He shall be prepared to guarantee to each of his subcontractors the locations and measurements which they may require for the fitting of their work to all surrounding work.

All equipment which is used on the work shall be of sufficient size and in such mechanical condition as to meet requirements of the work and to produce a satisfactory quality of work. Equipment used on any portion of the project shall be such that no injury to the roadway, adjacent property, or other highways will result from its use.

When the methods and equipment to be used by the Contractor in accomplishing the construction are not prescribed in the Contract, the Contractor is free to use any methods or equipment that will accomplish the work in conformity with the requirements of the Contract.

When the Contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized by the Engineer. If the Contractor desires to use a method or type of equipment other than those specified in the Contract, he may request authority from the Engineer to do so. The request shall be in writing and shall include a full description of the methods

and equipment proposed and the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing work in conformity with Contract requirements. If, after trial use of the substituted methods or equipment, the Engineer determines that the work produced does not meet Contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining work with the specified methods and equipment. The Contractor shall remove the deficient work and replace it with work of specified quality, or take such other corrective action as the Engineer may direct. Unless otherwise provided, no change will be made in basis of payment for the construction items involved nor in Contract time as a result of authorizing a change in methods or equipment under these provisions.

The Contractor and his Subcontractors shall not engage, on a full or part-time or other basis during the period of the Contract, any of the professional or technical personnel of the Division of Architecture, Engineering or Traffic and Transportation, or of any State, County or City Department, who are or have been at any time during the period of the Contract, or for 30 days prior to the award of the Contract, in the employ of such public agencies, except regularly retired employees, without the written consent of the public employer of such personnel.

GC-12 SUPERINTENDENT AND WORKMEN:

The Contractor shall attend to the work personally or through a competent, English-speaking superintendent on the work, authorized to receive and carry out instructions. The workmen shall be competent and shall perform their work in a neat and workmanlike manner. Any workman not properly qualified for his work or who is doing it in an unsatisfactory manner or contrary to the Specifications or the Engineer's instructions, or who is disorderly, shall be discharged if so requested by the Engineer, and shall not be employed again on the Project except with the approval of the Engineer. The superintendence and the number of workmen shall be sufficient, in the opinion of the Engineer, to insure the completion of the Project within the time stipulated therefor.

The Contractor shall also furnish to the City the telephone numbers of his superintendent and assistants for any emergency arising outside the normal work day schedule as a result of the Contract. If such an emergency does arise, and the City cannot contact the Contractor or his agents, or the Contractor or his agents do not arrive on the job site within two hours of such notification, the City reserves the right to correct the situation. Any costs incurred by the City shall be reported, in writing, to the Contractor for immediate payment. No additional estimates for work under this Contract shall be paid to the Contractor until the City is in receipt of payment for such emergency work.

GC-13 EQUIPMENT:

Good equipment only shall be used, and it shall be in proper working conditions. Sufficient equipment shall be used to insure the completion of the Project within the time specified. The equipment shall be operated so as not to damage public or private property. When a specific type or character of equipment is called for it shall be provided and used. All equipment shall be subject to the approval of the Engineer.

If the Contractor or his subcontractors do not own all or part of the equipment required, a written statement shall be submitted by the Contractor or his subcontractors, respectively, of the name and address of the owner or owners, stating that an agreement has been made to lease or loan the equipment and that in event of default, the Architect/Engineer has the right to take over and use such equipment or cause it to be used for completing the Project.

GC-14 WORKING SITE:

Any space that the Contractor may require for plant, equipment, storage or other purpose, in addition to that available therefore at the site of the Project, shall be procured by the Contractor and the cost thereof shall be included in the prices bid for the various items scheduled in the Proposal. In event of default the Architect/Engineer has the right to take over and occupy such space, or cause it to be occupied, for the purpose of completing the Project, at the Contractor's expense. If leased, the lease shall contain a provision that in event of default by the Contractor the lease may be assigned to the City or its nominee. The Contractor agrees in said default, that he will make such assignment.

GC-15 SANITARY PROVISIONS:

The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of his employees and for the use of government employees when the special provisions do not contain other provisions, to comply with the requirements of the State and local Boards of Health, or of other bodies or tribunals having jurisdiction. No direct payment will be made for the work required by this subsection, but the costs thereof will be considered to be included in bid prices of the contract. Attention is directed to Federal, State and local laws, rules and regulations concerning construction safety and health standards. The Contractor shall not require any worker to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his health or safety.

GC-16 MATERIALS AND WORKMANSHIP:

All materials used in the construction shall be new, except where reclaimed materials are indicated, and shall be furnished by the Contractor, and shall be approved by the Engineer. Request for approval of materials shall state the proposed source. All workmanship shall be satisfactory to the Engineer. Materials and workmanship not satisfactory shall be replaced by the Contractor without expense to the City.

The Contractor shall comply with provisions of the N.J. revised statutes 52:33-2 requiring that preference be given to the use of domestic materials.

The Contractor shall do all things necessary in connection with his work, and shall leave the premises in as good condition as found furnishing new materials and work if necessary.

The Contractor shall and will in good workmanlike manner, do and perform all work and furnish all supplies and materials, machinery, equipment, facilities and means, except as herein otherwise expressly specified, necessary or proper to perform and complete all the work required by this contract, within the time herein specified, in accordance with the provisions of this contract and said specifications and in accordance with the plans and drawings covered by this contract and any and all supplemental plans and drawings, and in accordance with the directions of the Engineer as given

from time to time during the progress of the work. He shall furnish, erect, maintain and remove such construction plant and such temporary works as may be required. The Contractor shall observe, comply with, and be subject to all terms, conditions, requirements, and limitations of the contract and specifications, and shall do, carry on, and complete the entire work to the satisfaction of the Engineer and the City.

The Contractor shall furnish to the Engineer for approval the manufacturer's detailed specifications for all machinery, mechanical and other special equipment, which he contemplates installing, together with full information as to type, performance characteristics, and all other pertinent information as required, and shall likewise submit for approval as required full information concerning all other materials or articles which he proposes to incorporate in the work.

Machinery, mechanical and other equipment, materials or articles installed or used without such prior approval shall be at the risk of subsequent rejection.

Materials specified by reference to the number or symbol of a specific standard, such as an A.S.T.M. Standard, a Federal Specification or other similar standard shall comply with requirements in the latest revision thereof and any amendment or supplement thereto in effect on the date of the Invitation for Bids, except as limited to type, class or grade, or modified in such reference. The standards referred to, except as modified in the Technical Specifications shall have full force and effect as though printed therein.

GC-17 TESTING AND INSPECTION OF MATERIALS:

All materials and equipment used in the construction of the project shall be subject to adequate inspection and testing in accordance with accepted standards. The laboratory or inspection agency shall be selected by the City. The City will pay for all laboratory inspection service direct, and not as a part of the Contract. When instructed, the Contractor shall furnish representative samples of materials and shall make them available for collection by the Engineer.

Materials of construction, particularly those upon which the strength and durability of the structure may depend, shall be subject to inspection and testing to establish conformance with specifications and suitability for uses intended.

This article shall not be construed to mean that the contractor is relieved from inspection services and/or test required by the technical specifications and payments to the same.

GC-18 SAMPLES, CERTIFICATES AND TESTS:

The Contractor shall submit all material or equipment samples, certificates, affidavits, etc., as called for in the Contract Documents or required by the Engineer promptly after award of the contract and acceptance of the Contractor's bond. No such material or equipment shall be manufactured or delivered to the site, except at the Contractor's own risk, until the required samples or certificates have been approved in writing by the Engineer. Any delay in the work caused by late or improper submission of samples or certificates for approval shall not be considered just cause for an extension of the contract time.

Each sample submitted by the Contractor shall carry a label giving the name of the Contractor, the project for which it is intended, and the name of the producer. The accompanying certificate or letter from the Contractor shall state that the sample complies with Contract requirements, shall give the name and brand of the product, its place of origin, the name and address of the producer and all specifications or other detailed information which assist the Engineer in passing upon the acceptability of the sample promptly. It shall also include the statement that all materials or equipment furnished for use in the project will comply with the samples and/or certified statements.

Approval of any materials shall be general only and shall not constitute a waiver of the City's right to demand full compliance with Contract requirements. After actual deliveries, the Engineer will have such check tests made as he deems necessary in each instance and may reject materials and equipment and accessories for cause, even though such materials and articles have been given general approval. If materials, equipment or accessories which fail to meet check tests have been incorporated in the work, the Engineer will have the right to cause their removal and replacement by proper materials or to demand and secure such reparation by the Contractor as is equitable.

Except as otherwise specifically stated in the Contract, the costs of sampling and testing shall be assumed by the Contractor. The Contractor shall furnish without extra cost, including packing and delivery charges, all samples and tests requested by the Engineer.

GC-19 CONTRACTOR'S TITLE TO MATERIALS:

No materials or supplies for the work shall be purchased by the Contractor or by any subcontractor subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. The Contractor warrants that he has good title to all materials and supplies used by him in the work, free from all liens, claims or encumbrances.

GC-20 ASSIGNMENT OR NOVATION:

The Contractor shall not assign or transfer, whether by an assignment or novation, any of its rights, duties, benefits, obligations, liabilities, or responsibilities under this Contract without the written consent of the City provided, however, that assignments to banks, trust companies, or other financial institutions may be made without the consent of the City. No assignment or novation of this Contract shall be valid unless the assignment or novation expressly provides that the assignment or novation expressly provides that the assignment of any of the Contractor's rights or benefits under the Contract is subject to a prior lien for performed services rendered, and materials, tools, and equipment supplied for the performance of the work under this Contract in favor of all persons, firms, or corporations rendering such labor services or supplying such materials, tools, or equipment.

GC-21 STORING OF MATERIALS:

All materials required in the work may be stored on the site upon which the work is to be constructed, subject to the approval of the Engineer. All such materials, tools and machinery shall be neatly and compactly piled in such manner as to cause the least inconvenience to the City and other contractors. All fire hydrants must at all times be kept free and unobstructed and water and gas shut-off boxes, underground power and telephone line manholes, sanitary and sewer manholes, must not be covered at any time by such materials.

Materials, tools and machinery shall not be piled or placed against shade trees unless they shall be amply protected against injury therefrom. All materials, tools, machinery, etc., stored upon public thoroughfares must be provided with flashing amber lights at nighttime to warn the traffic of such obstruction.

The Contractor shall arrange for the timely and orderly delivery of all materials and shall be responsible for their proper handling and protection.

Materials and equipment may be stored on the site, but the protection of same shall be the Contractor's responsibility. In storing materials within the site the Contractor shall consult with the Engineer.

GC-22 CLEAN-UP:

A. The Contractor shall at all times keep the project site and adjacent areas free of waste material, debris, rubbish and other unsuitable materials caused by his employees or work and shall remove same from any area of the site at least daily and additionally, if in the opinion of the Engineer such material, debris, rubbish, equipment or other material constitutes a hazard or nuisance.

   The Contractor shall not allow equipment nor materials to encumber the flow of any watercourse. No equipment shall be left unattended in any watercourse.

B. Upon completion of the work and before the final acceptance of the project, the Contractor shall remove all equipment, temporary work, unused and useless materials, rubbish and temporary buildings, shall repair or replace in an acceptable manner fences or other private or public property which may have been damaged or destroyed on account of the prosecution of the work, shall fill all depressions and water pockets on public and private property caused by his operations, shall remove all obstructions from waterways caused by his work, shall clean all drains and ditches within and adjacent to the site of the project which has been obstructed by his operations, and shall leave the site of the project and adjacent public and private property in a neat and presentable condition wherever his operations have disturbed conditions existing at the time of starting work. The Contractor shall procure and submit to the Engineer signed statements from property owners affected that he has fulfilled his obligations in the matters enumerated above with regard to their respective properties. Payment for final cleaning up and restoration of property as above provided will not be made under any specific item but the cost of this work shall be included in the priced bid for the various items scheduled in the Proposal.

GC-23 AUTHORITY OF THE ARCHITECT/ENGINEER:

Wherever the term Engineer is used through out these Specifications, it shall be understood to mean Architect/Engineer.

The Architect/Engineer shall make all necessary explanations as to the meaning and intent of the Contract Documents, shall give all orders and directions contemplated under the Contract, and in every case in which a difficult or unforeseen condition shall arise in the performance of the work the Architect/Engineer shall determine the adequacy of the Contractor's methods, plant, and appurtenances. The Architect/Engineer shall determine in all cases the quantity, quality, and

acceptability of the several kinds of work and materials and shall determine all questions in relation to the work and the construction thereof.

In case there is any inconsistency or ambiguity in the Contract Documents brought to his attention by the Contractor, the Architect/Engineer shall base his decision upon the premise that the more stringent interpretation was made by the Contractor in the submission of his bid. The Architect/Engineer shall decide any difference or conflicts which may arise between the Contractor and other Contractors of the City in regard to their work.

GC-24 APPEAL BY THE CONTRACTOR:

Should the Contractor take exception to any determination made by the Engineer relating to this Contract, the Contractor shall, within fourteen (14) calendar days, after receiving notification of such decision, file with the City a written notice of appeal, together with a full statement of facts as he believes them to be true. A copy of said notice and statement of facts shall be furnished to the Engineer.

Upon completion of the work, all matters of appeal shall be submitted to a Board of Arbiters, composed of three members, one of whom shall be appointed by the City, one by the Contractor, and the third member shall be chosen by the first two. The cost of appeal shall be borne by the Contractor in matters wherein the decisions of the Engineer are affirmed, and in other matters the costs shall be borne jointly by the Contractor and the City in such proportion as the Board of Arbiters shall determine.

The decision of the Board of Arbiters shall be conclusive and binding upon both the City and the Contractor.

GC-25 UNAUTHORIZED WORK:

Work done without lines and grade being given, work done beyond the lines and grades shown on the drawings or as given, or any extra work done without written authorization, will be considered unauthorized. Such work will be at the expense of the Contractor and will not be paid for by the City. Work so done may be ordered removed, and/or replaced by the Engineer at the Contractor's expense.

GC-26 INSPECTION:

The City shall have the right to inspect all work done and all materials furnished, including the preparation, fabrication and manufacture in mill, plant, shop and field of the materials to be used, and may assign an Inspector or other authorized representative for this purpose. The Contractor shall provide all facilities necessary for such inspection and shall furnish or cause to be furnished to the said Inspector or other authorized representative safe access at all times to the places where preparations, fabrication or manufacture of materials and construction of the work is in progress, as well as such information and assistance as may be required to make a complete and detailed inspection. The Engineer may undertake the inspection of materials at the source.

Manufacturing plants may be inspected periodically for compliance with specified manufacturing methods, and material samples will be obtained for laboratory testing for compliance with material quality requirements. In the event inspection is undertaken at the plant, the following conditions shall be met:

(a) The Engineer shall have the cooperation and assistance of the Contractor and the producer with whom he has contracted for materials.

(b) The Engineer shall have full entry at all times to such parts of the plant as may concern the manufacture or production of the materials being furnished.

If the Contractor is not the owner of the place where fabrication, preparation or manufacture is in progress, the owner thereof shall be deemed to be the agent of the Contractor with respect to the obligation assumed hereunder. The Contractor or his agent shall be responsible for the payment of claims for injuries to the City's authorized representative due to negligence on the part of the said Contractor or his agent. The cost of providing the necessary facilities, information, assistance and protection and of satisfying claims for injuries to the City's representative, as specified above, shall be included in the prices bid for the various items scheduled in the Proposal. If the specifications, the Engineer's instructions, laws, ordinance or any public authority require any work be tested or approved, the Contractor shall give the Engineer timely notice of its readiness in writing for inspection is by another authority other than the Engineer, the date fixed for such inspection shall be confirmed and made in writing.

Inspectors or other authorized representatives may be stationed on the work to report to the Engineer as to the progress thereof and the manner in which it is being performed, to inform him whenever it appears that the materials furnished and the work performed by the Contractor fails to conform to the requirements of the Plans and Specifications; and to direct the attention of the Contractor to such failure. The inspection, however, shall not relieve the Contractor from his obligations to furnish materials or perform work in conformity with the requirements of the Plans and Specifications.

The Inspector or other authorized representative is not authorized to revoke, alter, enlarge, relax or release any requirements of the Specifications or to issue instruction contrary to the Plans and Specifications. If a difference of opinion arises between the Inspector and the Contractor relating to the materials furnished or the performance of the work, the Inspector has the authority to reject the materials and notify the Contractor that further work on the construction involved will not be authorized and will be subject to nonpayment until the question at issue can be referred to and decided by the Engineer.

No work shall be closed or covered up until it has been duly inspected and approved. Should completed work be covered, the Contractor shall, at his own expense, uncover all such work so that it can be properly inspected; and after inspection, he shall properly repair and replace all such work if found defective.

At any time during the progress of the work and up to the date of final acceptance, the Engineer shall have the right to reject any work which does not conform to the requirements of the Contract Documents, even though such work has been previously inspected and paid for. Any omissions or failure on the part of the Engineer to disapprove or reject any work or materials at the time of inspection shall not be or be construed as an acceptance of any defective work or materials. If any

work or materials shall be condemned by the Engineer as defective or improperly done, the work shall be removed and/or reconstructed and replaced in a manner satisfactory to the Engineer and consistent with the intent of the Contract.

The Contractor shall notify the Engineer at least 72 hours prior to start of work of any change in the approved project schedule. In addition, the Contractor shall notify the Engineer during regular working hours on the day prior to any projected interruption in his operations.

Failure to give the proper notification as provided above may result in the rejection of uninspected work and materials, and a reduction in the final payment, in accordance with the liquidated damages sections of these Specifications.

The Contractor shall allow at all times any authorized persons representing The City of Jersey City, its consultants and the granting agencies to inspect the site.

GC-27 WORKING HOURS:

Working hours shall be between the hours of 8:00 A.M. and 4:30 P.M., prevailing time. Working before 8:00 A.M. or after 4:30 P.M. shall not be permitted except upon authorization by the Engineer. No work other than maintenance work shall be performed on Saturdays, Sundays, or legal holidays, except in the case of emergency and then only to the extent necessary and with the written approval of the Engineer. Should permission be obtained to perform night work, the Contractor shall provide, at his own expense, all lighting, safety and other facilities necessary for such work.

GC-28 INSPECTION SERVICES:

The wages and overhead of inspectors employed by the City shall be paid by the City except that the cost of such services required anytime on Saturdays, Sundays, or City holidays, or on weekdays outside of the hours 8:00 a.m. to 4:30 p.m. inclusive, shall be borne by the Contractor. The amount to be paid for by the Contractor for inspection work required on Saturdays, Sundays, City holidays and off-hours shall be at the rate of seventy dollars ($70.00) per hour per man.

City Holidays

New Year's Day	Labor Day
Martin Luther King Jr.'s Birthday	Columbus Day
Lincoln's Birthday	Election Day
Washington's Birthday	Veterans' Day
Good Friday	Thanksgiving Day
Memorial Day	Friday After Thanksgiving
Independence Day	Christmas

The cost of such services shall be deducted from payments due to the Contractor. If the Contractor is directed or requested in writing by the City or the Engineer to work Saturdays, Sundays, City holidays, or off-hours for the convenience of the City of Jersey City the above described reimbursement requirement will be waived.

GC-29 CONSTRUCTION LAYOUT:

General: Working from lines and levels established by the contract documents and as shown in relation to the work, the General Contractor shall establish and maintain bench marks and other dependable markers to set lines and levels to properly locate all work. The General Contractor shall calculate and measure required dimensions as shown (within recognized tolerances if not otherwise indicated); and shall not scale drawings to determine dimensions. Advise tradespersons performing work, of marked lines and levels provided for their use in layout of work.

Surveyor: The General Contractor shall engage a Land Surveyor experienced and specializing in land survey work, who is licensed in the State of New Jersey, to perform services specified in this article.

Survey Procedures: The General Contractor shall verify layout information shown on drawings, in relation to property survey and existing bench marks, before proceeding with layout of actual work. As work proceeds, surveyor shall check every major element for line, level and plumb (where applicable), and maintain an accurate surveyor's log or record book of such checks, available for Architect's or Engineer's reference at reasonable times. Surveyor shall record deviations from required lines and levels, and advise Architect or Engineer promptly upon detection of deviations exceeding indicated or recognized tolerances. The General Contractor shall record deviations which are accepted (not corrected) on record drawings.

No separate payment shall be made for the work described above; but the costs for this work shall be included in the prices bid for the various items scheduled in the Proposal; except when an item "Construction Layout" is scheduled in the Proposal.

GC-30 CLAIM FOR ADDITIONAL COMPENSATION:

If the Contractor claims that any instructions by Drawings or otherwise involve extra cost or extension of time, he shall, within ten (10) days after the receipt of such instructions, and in any event before proceeding to execute the work, submit his protest thereto in writing to the Engineer, stating clearly and in detail the basis of his objections. No such claim will be considered unless so made.

Any discrepancies which may be discovered between actual conditions and those represented by the Drawings and maps shall at once be reported to the Engineer and work shall not proceed except at the Contractor's risk, until written instructions have been received by him from the Engineer.

If, on the basis of the available evidence, the Engineer determines that an adjustment of the Contract Sum and/or Time is justifiable, the procedure shall be as provided in paragraphs 18 and 19 of the Information to Bidders.

GC-31 COMMENCEMENT AND PROCEDURE:

The contractor shall commence work not later than ten (10) calendar days after execution of the contract or as specified in the "Notice to Proceed" and shall continue operations without interruptions until the work is completed, except when weather or other conditions are interfering or the Engineer deems it advisable to suspend work.

The sequence of the work shall conform to the approved progress schedule submitted, provided, however, that said schedule may be modified from time to time as directed or approved by the Engineer. The Contractor shall give the Engineer not less than seven (7) days notice of the time and place or places he will start the work.

GC-32 NOTICE TO PROCEED:

A written "Notice to Proceed" will be issued by the Contracting Agent for the City of Jersey City.

GC-33 PROGRESS SCHEDULE AND PRECONSTRUCTION:

After the execution of the contract, but before the issuance of "Notice to Proceed" the contractor shall contact the Engineer to set up a preconstruction conference.

At the conference, the Contractor shall furnish the Engineer with a "Progress Schedule" and the anticipated amount of each monthly payment that will become due the Contractor in accordance with the "Progress Schedule" for his approval. Updated "Progress Schedules" shall be submitted with each monthly invoice. "Progress Schedules" shall be executed on forms approved by the City.

In addition to the "Progress Schedule", the Contractor shall submit to the Engineer a cost breakdown of his estimated cost of all the work, so arranged and itemized as to meet the approval of the Engineer. This breakdown shall be submitted promptly after execution of the agreement and before any payment is made to the Contractor for the work performed under this contract. After approval by the Engineer the prices established in the breakdown shall be used in estimating the amount of partial payments to the Contractor.

If required the progress schedule shall be prepared on the basis of an accepted critical path method of scheduling. The progress schedule may be used as the basis for establishing major construction operations and as a check on the progress of the work.

The Contractor shall provide sufficient materials, equipment, and labor to guarantee the completion of the project in accordance with the plans and specifications within the times set forth in the proposal.

If the Contractor falls significantly behind the submitted schedule, the Contractor shall:

a. Submit a revised schedule for completion of the work within the contract time.
b. Modify his operation to provide such additional materials, equipment, and labor necessary to meet the revised time estimates.

Should the prosecution of the work be discontinued for any reason, the Contractor shall notify the Engineer at least twenty-four (24) hours in advance of resuming operations.

GC-34 LIMITATION OF OPERATIONS:

The Contractor shall conduct the work at all times in such a manner and in such sequence as will assure the least interference with traffic. The Engineer may require the Contractor to finish a section on which work is in progress before work is started on any additional sections if the opening of such section is essential to public convenience.

GC-35 SHOP DRAWINGS AND SAMPLES:

All required shop drawings, machinery details, layout drawings, samples, etc. shall be submitted to the Engineer for approval sufficiently in advance of requirements to afford ample time for checking, including time for correcting, resubmitting and rechecking if necessary. The Contractor may proceed, only at his own risk, with manufacture or installation of any equipment or work covered by said drawings, etc. until they are approved and no claim by the Contractor for extension of the Contract time will be granted by reason of his failure in this respect.

Any drawings submitted without the Contractor's stamp of approval will not be considered and will be returned to him for proper resubmission. If any drawings show variations from the requirements of the contract because of standard shop practice or other reason, the Contractor shall make specific mention of such variation in his letter or transmittal in order that, if acceptable, suitable action may be taken for proper adjustment of Contract price and/or time. Otherwise the Contractor will not be relieved of the responsibility for executing the work in accordance with the Contract even though the drawings have been approved.

By approving and submitting Shop Drawings, the Contractor thereby represents that he has determined and verified all field measurements, field construction criteria, materials, catalog numbers and similar date, and that he has checked and coordinated each Shop Drawing with the requirements of the Work and of the Contract Documents. Shop Drawings shall be available on the site.

All calculations, if required, shall be signed and sealed by a New Jersey State licensed Professional Engineer. Date and reference of work shall be shown.

If a shop drawing is in accord with the Contractor or involves only a minor adjustment in the interest of the City of Jersey City not involving a change in Contract price or time, the Engineer may approve the drawing. The Engineer shall accept no responsibility for the Shop Drawings even though they carry his approval. The checking of the Shop Drawings is a gratuitous service to the General Contractor and in no way relieves the General Contractor of full responsibility for the completion of the job as drawn and specified. The approval shall be general and shall not relieve the Contractor from his responsibility for adherence to the contract or for any error in the drawing and shall represent in substance the following:

"Any modification shown on the attached drawings is approved in the interest of the City of Jersey City to effect an improvement for the Project and is ordered with the understanding that it does not involve any change in the Contract Price or time; that it is subject generally to all Contract stipulation and covenants; and that it is without prejudice to any and all rights to the City of Jersey City under the Contracts and surety bond or bonds."

Shop drawings and samples shall be dated and marked to show the names of the Project, Engineer, Contractor, originating subcontractor, manufacturer or supplier, and separate detailer if pertinent. Shop drawings shall completely identify Specification section and locations of which materials or equipment are to be installed. Reproductions of Contract Drawings are acceptable as Shop Drawings only when specifically authorized in writing by the Engineer.

Submission of shop drawings and samples shall be accompanied by 2 copies of a transmittal letter containing Project name, Contractor's name, number of drawings and samples, titles and other pertinent data.

Unless otherwise specified, the number of shop drawings and the number of samples which the Contractor shall submit and, if necessary, resubmit, is the number that the Contractor requires to be returned plus 2 copies which will be retained by the Engineer.

Submit minimum 4 prints of each shop drawing, including fabrication erection, layout and setting drawings and such other drawings as required under various sections of the Specifications, until final approval is obtained. Submit minimum 4 copies of manufacturers' description data including catalog sheets for materials, equipment and fixtures, showing dimensions, performance characteristics and capacities, wiring diagrams and controls, schedules, and other pertinent information as required. Where printed materials describe more than one product or model, clearly identify which is to be furnished.

Contractor is responsible for obtaining and distributing required approved prints of shop drawings to his subcontractors and material suppliers after as well as before final approval.

Contractor will keep one set of all approved shop drawings on the project site till completion of the entire project.

GC-36 TIME FOR COMPLETION, LIQUIDATED DAMAGES AND EXTENSION OF TIME:

It is hereby understood and mutually agreed by and between the Contractor and the City of Jersey City that the date of beginning and the time for completion as specified in the contract of work to be done hereunder are ESSENTIAL CONDITIONS of this contract: and it is further mutually understood and agreed that the work embraced in this contract shall be commenced within ten (10) calendar days from the execution of the contract or as specified in the Notice to Proceed.

The Contractor agrees that said work shall be prosecuted regularly, diligently and uninterruptedly at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the City of Jersey City that the time for the completion of the work described herein is a reasonable time for the completion of the same taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

Extension of Contract Time for extreme weather conditions will be granted in accordance with the following chart:

Number of Days the Contractor's Work is Limited to in One Month As the Result of Adverse Weather Conditions	Extension of Contract Time Allowable
16-31	0
15	1
14	2
13	3
12	4
11	5
10	6
9	7
8	8
7	9
6	10
5	11
4	12
3	13
2	14
1	15
0	16

In utilizing the above chart, the Architect will:

consider days on which an extension is granted under the category above "floods, tidal waves, earthquakes, cyclones, tornadoes, hurricanes or other cataclysmic natural phenomeon," as days on which the Contractor's work is limited as the result of adverse weather conditions;

consider days for which an extension is granted under the categories above for causes other than "floods, tidal waves, earthquakes, cyclones, tornadoes, hurricanes or other cataclysmic natural phenomeon" as days on which the Contractor worked and was unaffected by adverse weather conditions; and

make the above calculation based on the full 30 or 31 days in the calendar month as being days on which the Contractor could have worked without regard to Saturdays, Sundays and holidays.

If the said Contractor shall neglect, fail or refuse to complete the work within the time herein specified, or any proper extension thereof granted by the City of Jersey City then the Contractor does hereby agree, as a part consideration for the awarding of this contract, to pay to the City of Jersey City the amount specified herein, not as a penalty but as a liquidated damages for such breach of contract as hereinafter set forth, for each and every calendar day that the Contractor shall be in default after the time stipulated in the Proposal for completing the work.

Liquidated damages in the amount set forth in the following table will be charged for each calendar day of delay until the work is completed and accepted.

CHARGE FOR LIQUIDATED DAMAGES FOR EACH DAY OF DELAY

Original Contract Price

From More than-	To and Including	Calendar Day or Specified Completion Date
$ 0.	$ 50,000.	$ 250.
50,000.	100,000.	500.
100,000.	500,000.	750.
500,000.	1,000,000.	1,000.
1,000,000.	2,000,000.	1,250.
2,000,000.		1,500.

The said amount is fixed and agreed upon by and between the Contractor and the City of Jersey City because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the City of Jersey City would in such event sustain, and said amount is agreed to be the amount of damages which the City of Jersey City would sustain and said amount shall be retained from time to time by the City of Jersey City from current periodical estimates.

It is further agreed that time is of the essence of each and every portion of this contract and of the specification wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the contract an additional time is allowed for the completion of any work, the new time limit fixed by such extension shall be of the essence of this contract. Provided that the Contractor shall not be charged with liquidated damages or any excess cost when the City of Jersey City determines that the Contractor is without fault and the Contractor's reasons for the time extension are acceptable to the City of Jersey City.

Provided further, that the Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is due:

a. To any preference, priority or allocation order duly issued by the City of Jersey City.

b. To unforeseeable cause beyond the control and without the fault or negligence of the Contractor, including but not restricted to, act of God, or of the public enemy, acts of the City of Jersey City, acts of another Contractor in the performance of a contract with the City of Jersey City, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes and severe weather.

c. To any delays of subcontractors or suppliers occasioned by any of the caused specified in subsections a and b of this article: Provided further, that the Contractor shall, within ten (10) days from the beginning time prior to the date of final settlement of the contract, notify the City of Jersey City in writing, of the cause of delay, who shall ascertain the facts and extent of the delay and notify the Contractor within a reasonable time of its decision in the matter.

GC-37 NO DAMAGE FOR DELAY

The City shall have the right to defer the beginning or to suspend the whole or any part of the work herein contracted to be done whenever, in the opinion of the City Engineer, it may be necessary or expedient for the City to do so. If the Contractor is delayed in the completion of the work by act, neglect or default of the City, the City Engineer or of any of the contractors or consultants employed by the City upon the work; by change orders in the work; by strikes, lockouts, fire, unusual delay by common carriers, unavoidable casualties or any cause beyond the Contractor's control; or by any cause which the City Engineer shall decide to justify the delay; then for all such delays and suspensions, the Contractor shall be allowed one calendar day addition to the time herein stated for each and every calendar day of such delay so caused in the completion of the work as specified in GC-36 above, the same to be determined by the City Engineer, and a similar allowance of extra time will be made for such other delays as the City Engineer may find to have been caused by the City. No such extension shall be made for any one or more of such delays unless, within 10 calendar days after the beginning of such delay, a written request for additional time shall be filed with the City Engineer. Apart from the extension of time, no payment or allowance of any kind shall be made to the Contractor as compensation for damages on account of hindrance or delay for any cause in the progress of the work, whether such delay be avoidable or unavoidable.

The Contractor shall not be entitled to any damages or extra compensation from the City on the count of any work performed by the City or any other contractor or the City Engineer or any other party, or by reasons of any delays whatsoever, whether caused by the City or any other party including, and not limited to, the delays mentioned in this contract.

GC-38 ACCEPTANCE OF WORK:

When the Project has been completed, the Contractor shall notify the Engineer in writing. If it is not acceptable to the Engineer he will advise the Contractor as to the particular defects to be remedied before final acceptance will be made. Payments made to the Contractor before the final acceptance, do not commit the Engineer to the acceptance of the Project. The final inspection and acceptance will be made by the Engineer when the Project has been completed.

The City shall not be precluded or estopped by any measurement, estimate, or certificate, made either before or after the completion and acceptance of the Project and payment thereof, if such measurement, estimate or certificate be found to be in error or untrue, from showing the true amount and character of the work performed and materials furnished by the Contractor, or from showing that any such measurement, estimate or certificate is incorrectly made or untrue, or that the work or materials do not conform in fact to the requirements of the Contract. The City of Jersey City shall not be precluded or estopped, notwithstanding any such measurement, estimate or certificate, and payment made in accordance therewith, from recovering from the Contract and his Surety such damages as it may sustain by reason of the Contractor's failure to comply or to have complied with the terms of the Contract.

Neither the acceptance of the whole or any part of the Project by the Engineer or by any representative of the Engineer, nor any payment made for the work, nor any extension of time granted the Contractor, nor any possession taken by the Engineer, shall operate as a waiver of any portion of the Contract or of any power herein reserved, or of any right to damage herein provided. A waiver of any breach of the Contract shall not be held to be waiver of any other or subsequent breach.

GC-39 ACCEPTANCE OF FINAL PAYMENT AS RELEASE:

The acceptance by the Contractor of final payment shall be and shall operate as a release to the City of Jersey City of all claims and all liability to the Contractor for all things done or furnished in connection with this work and for every act and neglect of the City of Jersey City and others relating to or arising out of this work. No payment, however, final or otherwise, shall operate to release the Contractor or his Sureties from any obligation under this contract or the Performance and Payment Bond.

GC-40 SUSPENSION OF WORK:

The Engineer may, by written order, suspend the performance of the work, either in whole or in part for such periods as he deems necessary. Reasons for suspension of work include but are not limited to the following:

a) Due to weather or soil conditions considered unsuitable for prosecution of the work; or

b) For failure of the Contractor to:

1. Correct conditions unsafe for the workmen or the general public; or
2. Carry out orders given by the Engineer; or
3. Perform any provisions of the Contract.

Suspension of work on some but not all items will be considered "partial suspension." Work of an emergency nature ordered by the Engineer for the convenience of public traffic and minor operations not affected by or connected with the cause of suspension may be performed during a period of total suspension if permitted by the Engineer.

No compensation or allowance will be made on account of such suspensions unless it shall be for more than 10 working days. Should this suspension be for more than 10 working days and should the Contractor be put to additional expense on account thereof, he shall have the right to file with the Engineer a statement showing the character and amount of such additional expense and, if the Engineer deems it a proper charge, the Contractor will be reimbursed therefor. However, he shall have no claim for additional expense for said first ten days of suspension, and any claim for all allowances as above provided shall be filed, in writing, with the Engineer before the expiration of the first ten days of suspension. No payment will be made for work done by the Contractor on suspended work.

Any adjustment of Contract Time for suspension of the work shall be as provided in subsection entitled TIME FOR COMPLETION, EXTENSION OF TIME.

GC-41 RIGHT OF THE CITY TO DECLARE CONTRACTOR IN DEFAULT:

The City of Jersey City has the right to declare the Contractor in default under the following circumstances:

a) If the Contractor fails to begin the work within the required time.
b) If the work to be done under this Contract is abandoned.
c) If the Contractor is adjudged bankrupt or makes an assignment for the benefit of creditors.
d) If the Contractor fails to or refuses to regard laws, ordinances, regulations, and such orders as given by the City of Jersey City or Architect with respect to the work.
e) If the Contractor, after notice from the Architect, refuses or fails to supply enough properly skilled workmen or proper materials or equipment.
f) If the Contractor violates any of the provisions of this Contract or shall not perform the same in good faith.
g) If the Contractor refuses or fails to prosecute the work or any part thereof with such diligence as will insure the work's completion within the specified period (or any duly authorized extension) or fails to complete the work within the prescribed period.
h) If the Contractor fails to make prompt payment to persons supplying labor or materials for the work.
i) If the Contractor assigns or sublets the work otherwise than as specified.
j) If the Contractor fails to remove an incompetent foreman or superintendent as requested by the Architect.
k) If the Architect is of the opinion, and has certified in writing, that the work or any part thereof is unnecessarily or unreasonably delayed, or that the Contractor is not complying with the order of the Architect, or that sufficient workmen, materials, plant, tools, supplies, safety standards, or other means of carrying on the work are not provided to carry out all the requirements of the Contract.

The City of Jersey City shall serve written notice to the Contractor ordering the Contractor not to begin, or not to resume, or to discontinue all work under this Contract for any of the above stated reasons.

The City of Jersey City may then enter upon and take possession of the work, or any part thereof and may complete the work by purchase of necessary materials and equipment and by direct employment of labor; or the City of Jersey City may cause the work to be completed by other persons by contract without advertising; or the City of Jersey City may readvertise and re-let the uncompleted portions of the work and all expenses of financial loss to the City of Jersey City by reason of any of the above methods for completing the unfinished work shall be deducted out of monies then due, or to become due the Contractor under this Contract.

In case such expenses shall exceed the amount which would have been payable under this Contract, if the same had been completed by the Contractor, the Contractor or his sureties shall pay the amount of such excess to the City of Jersey City.

Should such expense be less than the amount payable, under this Contract, had the same been completed by the Contractor, the Contractor or his Surety shall receive the difference after deducting the amount retained as herein before specified.

All the work undertaken by the City of Jersey City, by contract or otherwise, shall be certified by the Architect as to the amount of work done, the cost and amount of excess cost, if any. Such certification shall be binding and conclusive upon the Contractor, his sureties, successors, assigns or lienors.

In case this Contract, or any alterations or modifications thereof be thus terminated, the decision of the City of Jersey City shall be conclusive, and said Contractor shall not be allowed to claim or receive any compensation or damages for not being allowed to proceed with the work.

GC-42 REMOVAL OF EQUIPMENT:

In case of termination of work, from any cause whatever, prior to completion, the Contractor shall promptly remove any part or all of his equipment and supplies from the work. If such removal is not completed within five (5) working days after written notification by the City of Jersey City, the City of Jersey city shall have the right to remove such equipment and supplies at the expense of the Contractor.

GC-43 PAYMENTS:

The Contractor will be entitled to monthly payments for portions of the project work which have been fully completed as required by the Contract to the satisfaction of the Architect and such completion has been certified by the Architect.

To insure proper performance of the Contract, the City shall retain a percentage of the amount of each estimate as herein after described until final completion and acceptance of all work covered by the Contract.

Applications for Payment are to be submitted on the G702 and G703 forms and be based on the schedule of values that were submitted at the Preconstruction Conference. Four (4) copies of the Application for Payment are to be submitted to the architect showing completion of the term of the payment term as of the 30th of each month.

Applications for Payment are to be submitted with four (4) copies to the Division of Architecture.

Release of Liens, schedule update, and other material required to accompany the Application must be included in order to receive payment on the Application.

The contractor is to include along with the Application for Payment, a Release of Liens (payment of debits and claims form attached) on the attached form with each Application for Payment for the previous payment period.

In preparing estimates, the material delivered on the site and preparatory work done may be taken into consideration, if the Contractor furnishes releases of liens for the materials at the time each estimate of work is submitted for payment. All materials and work covered by partial payments made shall thereupon become the sole property of the City, but this provision shall not be construed as relieving the Contractor from the sole responsibility for the care and protection of materials and work upon which payments have been made or the restoration of any damaged work, or as waiver of the right of the City to require fulfillment of all the terms of the Contract.

The Contractor agrees that he will indemnify and save the City harmless from all claims growing out of the lawful demands of subcontractors, laborers, workmen, mechanics, materialmen, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the furtherance of the performance of this contract. The Contractor shall, at the City's request, furnish satisfactory evidence that all obligations of the nature hereinabove designated have been paid, discharged, or waived. If the Contractor fails to do so, then the City may, after having

served written notice on the said Contractor, either pay unpaid bills, of which the City has written notice, direct, or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the Contractor shall be resumed, in accordance with the terms of this contract, but in no event shall the provisions of this sentence be construed to impose any obligations upon the City to either the Contractor or his Surety.

In paying any unpaid bills of the Contractor, the City shall be deemed the agent of the Contractor, and any payment so made by the City, shall be considered as a payment made under the contract by the City to the Contractor, and the City shall not be liable to the Contractor for such payment made in good faith.

A. LUMP SUM PAYMENTS:

The sum bidded for any lump sum items shall constitute payment in full for all of the various classes of work, including materials, equipment and labor necessary or required to complete, in conformity with the Contract Documents, the entire Project Work shown, indicated or specified under such lump sum item.

B. PROGRESS PAYMENTS:

(1) On lump sum items, the Contractor shall submit to the Architect for his approval, prior to the start of the Work under the Contract, a schedule giving a breakdown of labor, materials, equipment and other costs used in preparation of the bid. This schedule shall be in sufficient detail to indicate separate figures for excavation, concrete, reinforcing steel, equipment, and all other items which make up the lump sum price. This schedule shall be used in computing the periodic estimate which is issued monthly, and as a basis for negotiations concerning any credits which may arise during the execution of the Work of this Contract.

(2) During the first ten days of each month, the Architect, in consultation with the Contractor, will estimate the amount of work during the preceding calendar month. The quantities so determined will be used as the basis for a periodic estimate. The periodic estimate will be presented to the Architect by the Contractor and shall indicate the value of the work performed and materials and equipment built into the Project, in accordance with the Contract. As soon as practicable thereafter, the City will pay the Contractor an amount equal to the value of such work, materials and equipment indicated on the periodic estimate less the amount of all previous payments. The retainage as hereinafter described shall be deducted from each and every estimate presented during the Contract and shall be retained until final completion and acceptance of all work covered by the Contract.

(3) No claim by the Contractor for additional payment based on any error in any periodic estimate will be recognized.

(4) The City may withhold payment for any of the following:

a. Failure to submit a revised progress schedule, which has been approved by the Architect, with each monthly invoice.

b. Defective work not corrected.

c. Claims filed or responsible evidence indicating probability of filing claims.

d. Failure of the Contractor to make proper payments to Subcontractors or for material or labor.

e. Unpaid damages by the Contractor to Subcontractors, the City or any other agency or person.

f. If in the judgement of the Architect the Project is not proceeding in accordance with the Contract or the Contractor is not complying with the requirements of the Contract Documents.

g. The Contractor is found to be in default.

(5) No payment voucher shall protect the Contractor and no claim shall be founded thereon by the Contractor in case of overpayment or in case it shall at any time appear that the Project or any part thereof have not been constructed, completed and maintained in strict accordance with the Contract Documents.

(6) No interim payment voucher shall be held to signify the approval of permanent work, materials, or other things to which such certificate relates, and the Contractor shall not be relieved by any such certificates from any risks or liability to which he may be subject under the Contract until the Final Certificate, hereinafter referred to, has been granted to them.

(7) Errors in any monthly measurements or bill, on being discovered, shall be rectified by the Architect in subsequent measurements and bills.

(8) If any work the value of which has been included in any interim bill is damaged or destroyed and has to be removed or reconstructed by the Contractor, an amount representing the value of the work so damaged or destroyed, less any insurance monies therefor received by the City, shall be deducted by the Architect in succeeding monthly bills until such time as such work has been renovated or reconstructed.

(9) The State Law requires that all claims for payments must be approved by the governing body of the municipality. The Contractor should allow 4 to 6 weeks for receipt of partial payment after the payment has been approved by the Architect.

C. RETAINAGE:

The following procedures will apply in accordance with the Contractor's chosen option of retainage as indicated on the proposal:

(1) An amount of ten percent (10%) of each and every payment made to the contractor shall be withheld by the City until the project is completed to the satisfaction of the City; and all maintenance bonds, plans, shop drawings, etc., are in the possession of the City; and all other requirements of the contract are met by the contractor. The amount withheld shall be deposited with a banking institution or savings and loan association insured by an agency of the federal

government, in an account bearing interest at the rate currently paid by such institutions or associations on time or savings deposits. Any interest accruing on cash payments withheld shall be credited to the City.

(2) Whenever any contract, the total price of which exceeds $100,000.00, is entered into by the City for the Construction, reconstruction, alteration or repair of any building, structure, facility or other improvement of real property, the amount of withholding enumerated in Item (1) shall be reduced to two percent (2%) pursuant to N.J.S.A. 40A:11-16.3. All other provisions of Item (1) shall remain in full force and effect.

(3) In lieu of the withholding of funds as prescribed in Item (2) above, the contractor may agree to deposit with the City, negotiable bearer bonds of the State of New Jersey, or negotiable bearer bonds or notes of any political sub-division of the State, the value of which is equal to the amount necessary to satisfy the amount that otherwise would be withheld pursuant to Item (2) above. The nature and amount of the bonds or notes to be deposited shall be subject to the approval of the City. For purposes of this section, "value" shall mean par value or current market value, whichever is lower. The bonds shall be returned to the contractor pursuant to the same conditions for retainage which is stated in Item (1) above.

The bidder shall denote in the Proposal the method of his choice in accordance with the above amount.

As to the subject retainage, the above provisions are controlling and any and all other references to retainage in these specifications which conflict with the above sections shall be interpreted in the light of the above and, this section taking a precedent over any other.

D. FINAL PAYMENT:

(1) Upon written notice from the Contractor that the Project is complete, the Architect will make a final inspection and will notify the Contractor in writing of any particulars in which this inspection reveals that the Work is defective. The Contractor shall immediately make such corrections as are necessary to remedy such defects.

(2) When the Contractor has completed all such corrections to the satisfaction of the Architect and delivered all maintenance and operating instructions, schedules, guarantees, bonds, certificates and other documents, all as required by the Contract Documents, he may make application for final payment. The Architect will determine from actual as-built field measurement, the amount of the work performed by the Contractor, and also the value of such work under and according to the terms of the Contract. After final acceptance of the Project completed, in place, tested and ready for use the Architect will process the final certificate for payment upon receipt of a maintenance bond as described in these specifications. The final payment will include retainage and all other monies due the Contractor as determined by the Architect. The final certificate will also serve as an instrument to recommend release of negotiable securities held as retainage.

(3) The acceptance by the Contractor of final payment shall be and shall operate as a release to the City of all claims and all liability to the Contractor for all things done or furnished in connection with this work and for every act and neglect of the City and others relating to or arising out of

this work. No payment, however, final or otherwise shall operate to release the Contractor or his Sureties from any obligation under this contract or the Performance and Payment Bond.

GC-44 MAINTENANCE BOND:

Before final payment is made, the Contractor shall furnish a surety corporation bond to the Architect in a sum equal to one hundred percent (100%) of the Contract price. The bond shall remain in full force and effect for a period of two (2) years from the date of acceptance of the Project by the Architect, regardless of the date of installation of individual items, and shall provide that the Contract guarantees to replace for said period of two (2) years all work performed and all materials furnished that were not performed or furnished according to the terms and performance requirements of the contract, and made good the defects thereof which have become apparent before the expiration of the said period of two (2) years.

If, in the judgment of the Architect, any part of the Project need be replaced, repaired or made good during the specified guarantee period, for the reasons stated above, he will so notify the Contractor in writing. If the Contractor refuses or neglects to start such work within five (5) days from the date of service of such notice or at such other time as the Architect may direct, or if he fails to complete such work within the time prescribed by the Architect, the Contractor agrees that the Architect may have the work done by others and the cost thereof shall be paid by the Contractor, or his Surety. Before the Surety is released from its bond, the Architect shall certify in writing that the forgoing obligations have been duly performed.

GC-45 SUBCONTRACTING:

The Contractor shall not subcontract, sublet, sell transfer, assign, or otherwise dispose of any portion of the contract work without written consent of the Architect. Before consent is given to subcontract any work, the Contractor, if requested by the Architect, shall present evidence that the proposed subcontractor is fully qualified to do the work. If consent is given, the Contractor will be permitted to subcontract a portion of the work, but shall perform with his own organization, work amounting to not less than fifty percent (50%) of the original contract amount, except that any items designated in the contract as "specialty items" may be performed by subcontract and the cost of any such specialty items so performed by subcontract may be deducted from the original contract amount before computing the amount of work required to be performed by the Contractor with his own organization. No subcontracts shall relieve the Contractor of his liability under the contract and bonds.

No subcontract, approval of a subcontract, or any other action shall create any contractual relation between subcontractors and the City of Jersey City. The contractor shall be liable and responsible for any action or lack of action of a subcontractor. Contractors and subcontractors shall be charged with all direct, imputed or presumed knowledge the others might possess.

Within ten (10) days after award, either by the Contractor or subcontractor, of any subcontract for performance of work at the construction site, the Contractor shall deliver to the Contracting Officer and Architect an executed statement and acknowledgment in regard to award of subcontract and incorporation of labor clauses in the subcontract.

GC-46 PREVAILING RATE OF WAGES ON PUBLIC CONTRACTS:

The attention of all bidders is specifically called to the fact that wage rates determined by the Commissioner of Labor and Industry, in accordance with the provisions of Chapter 150 of the Laws of 1963, commonly known as the Prevailing Wage Act, shall be required to be paid for all services performed under this contract.

The wages to be paid for a legal day's work to laborers, workmen or mechanics employed upon the work contemplated by this contract or upon any materials to be used thereon shall not be less than the "prevailing rate of wage", pursuant to law, which Schedule of Wage Rates is on file in the office of the Purchasing Agent and hereby made part of this contract.

The act also provides among other requirements, the following, which are selected excerpts from the statute:

> Every contract in excess of $2,000.00 for any public work to which any public body is a party shall contain a provision stating the prevailing wage rate which can be paid (as shall be designated by the Commissioner) to the workmen employed in the performance of the contract and the contract shall contain a stipulation that such workmen shall be paid not less than such prevailing wage rate. Such contract shall also contain a provision that in the event it is found that any workman, employed by the Contractor or any Subcontractor covered by said contract, has been paid by such contract the public body may terminate the Contractor's or Subcontractor's right to proceed with the work, or such part of the work as to which there has been a failure to pay required wages and to prosecute the work to completion or otherwise. The Contractor and his sureties shall be liable to the public body for any excess costs occasioned thereby.
>
> The public body awarding any contract for public work or otherwise undertaking any public work shall ascertain from the commissioner the prevailing wage rate in the locality in which the public work is to be performed for each craft or trade needed to perform the contract and shall specify in the contract itself what the prevailing wage rate in the locality is for each craft or trade or classification of all workmen needed to perform the contract during the anticipated term thereof. Nothing in this act however shall prohibit the payment of more than the prevailing wage rate to any workmen employed on a public work.
>
> Every Contractor and Subcontractor shall keep an accurate record showing the name, craft or trade and actual hourly rate of wages paid to each workman employed by him in connection with a public work and such records shall be preserved for two (2) years from date of payment. The record shall be open at all reasonable hours to the inspection of the public body awarding the contract and to the commissioner.
>
> The State of New Jersey Department of Labor and Industry prevailing wage rates are made a part of this Contract for performance of the work described.

GC-47 EQUAL EMPLOYMENT OPPORTUNITY/AFFIRMATIVE ACTION:

Bidders (Contractors) are required to comply with the requirements of N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27. No firm may be issued a contract unless it complies with these equal employment opportunity and affirmative action provisions. The following information summarizes the full, required regulatory text, which is included as Exhibit B of this Bid specification:

> After notification of award, but prior to signing a construction contact, the contractor shall submit to Public Agency Compliance Officer and the New Jersey Division of Contract Compliance & Equal Employment Opportunity in Public Contracts, an Initial Project Workforce Report (Form AA-201) provided to the public agency by the Division for distribution to and completion by the contractor, in accordance with N.J.A.C. 17:27-7.
>
> The contractor shall also submit a copy of the Monthly Project Workforce Report once a month thereafter for the duration of the contract to the Division and the Public Agency Compliance Officer. The contractor shall also cooperate with the public agency in the payment of budgeted funds, as is necessary, for on-the job and/or off-the-job programs for outreach and training of minorities and women.

GC-48 AMERICANS WITH DISABILITIES ACT OF 1990:

Discrimination on the basis of disability in construction contracting is prohibited. Bidders are required to read Americans With Disabilities language that is included as Appendix A of this specification and agree that the provisions of Title II of the Act are made a part of the contract. The contractor is obligated to comply with the Act and to hold the owner harmless.

GC-49 NOT USED

GC-50 WARRANTY OF TITLE:

No material, supplies, or equipment to be installed as part of the work shall be purchased subject to any chattel mortgage or under a conditional sale or other agreement by which an interest therein or in any part thereof is retained by the seller or supplier. The Contractor shall warrant good title to all materials, supplies and equipment installed or incorporated in the work and, upon completion of all work shall deliver the same together with all work and appurtenances constructed or placed thereon by him to the City of Jersey City free from any claim, liens, or charges. Neither the Contractor nor any person, firm, or corporation furnishing any material or labor for any work covered by this Contract shall have any right to a lien upon any work or appurtenance thereon. Nothing contained in this paragraph, however, shall defeat or impair the right of person furnishing materials or labor to recover under any bond given by the Contractor for their protection or any rights under any law

permitting such person to look to funds due Contractor in the hands of the City of Jersey City. The provisions of this paragraph shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing materials for the work when no formal contract is entered into for such materials. At the completion of work and prior to final acceptance by the Architect, the contractor shall execute the attached form entitled Warranty of Good Title.

GC-51 COMMUNICATIONS:

All notices, demands, requests, instructions, approvals, proposals and claims must be in writing.

GC-52 DEFECTIVE WORK:

All materials furnished and all work performed which, in the opinion of the Architect, is not in accordance with the plans and specifications shall be removed from the City immediately, and other materials which are satisfactory shall be furnished and work which is satisfactory shall be performed. In the event that defects are discovered, the Contractor shall immediately take all actions necessary to correct any and all defects to achieve compliance with the Plans, Specifications or as directed by the Architect. The contractor is responsible for his own work and that of his subcontractors. The contractor is to guarantee that all work and materials are in all respects conformable to the Plans and Specifications.

GC-53 CO-RELATED SPECIFICATIONS:

In addition to these specifications, the following Standard Specifications & Codes shall be considered a part of these specifications where such specifications are applicable, and shall include all current changes and revisions:

New Jersey State Highway Department Standard Specifications for Road and Bridge Construction, 1983 as currently amended.
National Electrical Code for the National Board of Fire Underwriters.
Standard Specifications of American Water Works Association.
State of New Jersey Uniform Construction Code, Chapter 23, Title 5, New Jersey Administration Code.
American Concrete Institute Building Code.
National Standard Plumbing Code.
Ordinances and Laws of the City of Jersey City
American Society for Testing and Materials.

GC-54 USE AND OCCUPANCY PRIOR TO ACCEPTANCE BY THE CITY:

The contractor agrees to the use and occupancy of a portion or unit of the project before formal acceptance by the City, provided the City:

a. Secures written consent of the Contractor except in the event, in the opinion of the Architect/Engineer, the Contractor is chargeable with unwarranted delay in completing the contract requirements:

b. Secures consent of the Surety:

c. Secures endorsement from the insurance carrier(s) permitting occupancy of the building or use of the project during the remaining period of construction: or

d. When the project consists of more than one building, and one of the buildings is occupied, secures permanent fire and extended coverage insurance, including a permit from the insurance carrier to complete construction.

GC-55 STATED ALLOWANCES:

The Contractor shall include in his proposal the cash allowances if any, stated in the Technical Specification Conditions. The Contractor shall purchase the "Allowed Materials" as directed by the Architect on the basis of the lowest and best bid of at least three competitive bids. If the actual price for purchasing the "Allowed Materials" is more or less than the "Cash Allowances", the contract price shall be adjusted accordingly. The adjustment in contract price shall be made on the basis of the purchase price without additional charges for overhead, profit, insurance or any other incidental expenses. The cost of installation of the "Allowed Materials" shall be included in the applicable sections of the contract specifications covering this work.

GC-56 PROOF OF BUSINESS REGISTRATION

P.L. 2004, c. 57 (Chapter 57) amends and supplements the business registration provisions of N.J.S.A. 52:32-44 which requires that each bidder (contractor) submit proof of business registration with the bid proposal or prior to the contract award. Proof of Registration shall be a copy of the bidder's Business Registration Certificate (BRC). A BRC is obtained from the New Jersey Division of Revenue. Information on obtaining a BRC is available on the internet at www.njgov/njbgs or by phone at (609) 292-1730. N.J.S.A. 52:32-44 imposes the following requirements on contractors and all subcontractors that **knowingly** provide good or perform services for a contractor fulfilling this contract:

a) The contractor shall provide written notice to its subcontractors and suppliers to submit proof of business of business registration to the contractor;
b) Prior to receipt of final payment from a contracting agency, a contractor must submit to the contracting agency an accurate list of all subcontractors or attest that none was used;

c) During the term of this contract, the contractor and its affiliates shall collect and remit, and shall notify all subcontractors and their affiliates that they must collect and remit to the Director, New Jersey Division of Taxation, the use tax due pursuant to the Sales and Use Tax Act, (N.J.S.A. 54:32B-1 et seq.) On all sales of tangible personal property delivered into this State.

A contractor, subcontractor or supplier who fails to provide proof of business registration or provides false business registration information shall be liable to a penalty of $25 for each day of violation, not the exceed $50,000 for each business registration not properly provided or maintained under a contract with a contracting agency. Information on the law and its requirements is available by calling (609) 292-1730.

P.L. 2004, c. 57 (N.J.S.A. 52:32-44)
MANDATORY BUSINESS REGISTRATION LANGUAGE

Construction Contracts

The contractor shall provide written notice to its subcontractors and suppliers of the responsibility to submit proof of business registration to the contractor. The requirement of proof of business registration extends down through all levels (tiers) of the project.

Before final payment on the contract is made by the contracting agency, the contractor shall submit an accurate list and the proof of business registration of each subcontractor or supplier used in the fulfillment of the contract, or shall attest that no subcontractors were used.

For the term of the contract, the contractor and each of its affiliates and a subcontractor and each of its affiliates [N.J.S.A. 52:32-44(g)(3)] shall collect and remit to the Director, New Jersey Division of Taxation, the use tax due pursuant to the Sales and Use Tax Act on all sales of tangible personal property delivered into this State, regardless of whether the tangible personal property is intended for a contract with a contracting agency.

A business organization that fails to provide a copy of a business registration as required pursuant to section 1 of P.L.2001, c.134 (C.52:32-44 et al.) or subsection e. or f. of section 92 of P.L.1977, c.110 (C.5:12-92), or that provides false business registration information under the requirements of either of those sections, shall be liable for a penalty of $25 for each day of violation, not to exceed $50,000 for each business registration copy not properly provided under a contract with a contracting agency."

STATE OF NEW JERSEY
BUSINESS REGISTRATION CERTIFICATE
FOR STATE AGENCY AND CASINO SERVICE CONTRACTOR

DEPARTMENT OF TREASURY
DIVISION OF
PO BOX 252
TRENTON, N

TAXPAYER NAME:
TAX REGISTRATION TEST ACCOUNT

TAXPAYER IDENTIFICATION#:
[illegible]

ADDRESS:
[illegible]BLING A
TRENTON NJ 08
[illegible]VE DA
01/01
[illegible]RC(08

TRA[illegible]AM
CL[illegible]STRA
SEQ[illegible]E NUMBER:
0107[illegible]

ISSUANCE DATE:
07/14/04

Acting Director

This Certificate is NOT assignable or transferable. It must be conspicuously displayed at above address.

SAMPLE

STATE OF NEW JERSEY
BUSINESS REGISTRATION CERTIFICATE

Taxpayer Name:	TAX REG TEST ACCOUNT
Trade Name:	
Address:	847 ROEBLING AVE TRENTON, NJ 08611
Certificate Number:	1093907
Date of Issuance:	October 14, 2004

For Office Use Only:

20041014112823533

GC-57 SCHEDULE OF SUBMITTALS BY BIDDER

SUBMITTAL ITEM	TIME OF SUBMISSION	CONSEQUENCES OF NON COMPLIANCE
1. Proposal	Prior to Bid Opening	Bid Rejected
2. Certificate of Experience of General Contractor	With Proposal	Bid Rejected
3. Certificate of Experience of Subcontractors listed pursuant to N.J.S.A. 40A:11-16	With Proposal, or within 24 hours of bid opening	Bid May Be Rejected
4. Plant and Equipment Questionnaire of General Contractor	With Proposal	Bid Rejected
5. Plant and Equipment Questionnaire of Subcontractors listed pursuant to N.J.S.A. 40A:11-16	With Proposal, or within 24 hours of bid opening	Bid May Be Rejected
6. Non-Collusion Affidavit	With Proposal, or within 24 hours of bid opening	Bid May Be Rejected
7. Corporation or Partnership Statement	With Proposal	Bid Rejected
8. Bid Guarantee	With Proposal	Bid Rejected
9. Consent of Surety	With Proposal	Bid Rejected
10. New Jersey Business Registration Certificates for General Contractor and all Subcontractors listed pursuant to N.J.S.A. 40A:11-16	With Proposal or prior to the Contract award	Bid May Be Rejected
11. Written Acknowledgment of addenda (if issued) pursuant to N.J.S.A. 40A:11-23.2(e)	With Proposal (See Bid Form P-1)	Bid Rejected
12. Public Works Contractor Registration Certificates for General Contractor and all Subcontractors listed pursuant to N.J.S.A. 40A:11-16	With Proposal or prior to the Contract award	Bid Rejected (See Section 7 of Information to Bidders)
13. Exhibit B: Mandatory Equal Employment Opportunity Language	With Proposal, or within 24 hours of bid opening	Bid May Be Rejected
14. MWBE (Contractor Compliance Plan)	With Proposal, or within 24 hours of bid opening	Bid May Be Rejected

SUBMITTAL ITEM	TIME OF SUBMISSION	CONSEQUENCES OF NON COMPLIANCE
15. Initial Manning Report (JCAA-1)	After notification of award but prior to signing a construction Contract	Forfeiture of Bid Security
16. Monthly Project Workforce Report	Once a month thereafter for the Duration of Contract	Default of Contract
17. Insurance Certificates	Prior to Execution of Contract by the City	Forfeiture of Bid Security
18. Performance and Payment Bond	Prior to Execution of Contract by the City	Forfeiture of Bid Security
19. Execution of Contract Agreement	Within 10 days of City Notice of Contract Award	Forfeiture of Bid Security
20. Construction Permits	Prior to Start of Construction (where required)	Default of Contract
21. Subcontractor Prequalification and Insurance other than those listed under N.J.S.A. 40A:11-16	Prior to Subcontractor's Participation	Denial of Subcontractor or Default
22. Material Certifications	Prior to Incorporation in Project	Removal of Unapproved Materials or Default of Contract
23. Shop Drawings	Prior to Incorporation in Project	Removal of Unapproved Materials or Default of Contract
24. Preconstruction Photographs	Prior to Commencement of Work or Stockpiling of Materials (where required)	Default of Contract
25. Notification to Public Utilities	Prior to Commencement of Work	Default of Contract
26. Commencement of Work	Within 10 days of Contract or as Stated in "Notice to Proceed"	Default of Contract
27. Claims for Extra Cost	Within 48 Hours of Instructions from Architect	Denial of Claim
28. Construction Schedule Periodic Estimates	Prior commencement of work and following with each partial payment	Payment Withheld Until Received
29. Request for Additional Time	Within 10 days of Beginning of Delay	Denial of Request Liquidated Damages
30. Water Sample Analysis or other Required Tests	Testing of New Water Mains and Equipment	No Acceptance Final Payment Withheld

The Contractor shall provide all submittals required under this Contract whether or not listed above.

WARRANTY OF GOOD TITLE

City of Jersey City
280 Grove Street
Jersey City, New Jersey 07302

ARCHITECT'S PROJECT NO:

CONTRACT FOR:

CONTRACT DATE:

PROJECT :
(name, address)

State of:

County of:

This is to certify that no material, supplies, or equipment installed as part of the work of this contract, was purchased subject to any chattel mortgage or under a conditional sale or other agreement by which an interest therein or in any part thereof is retained by the seller or supplier. The contractor shall warrant good title to all materials, supplies and equipment installed or incorporated in the work and, upon completion of all work shall deliver the same together with all work and appurtenances constructed or placed thereon by him to the City of Jersey City free from any claim, liens, or charges. Neither the contractor nor any person, firm, or corporation furnishing any material or labor for any work covered by this contract shall have any right to a lien upon any work or appurtenance thereon.

CONTRACTOR:

Address:

BY:

Subscribed and Sworn to before me this
day of 20

Notary Public:

My Commission Expires:

CONTRACTOR'S AFFIDAVIT OF RELEASE OF LIENS

City of Jersey City
280 Grove Street
Jersey City, New Jersey 07302

ARCHITECT'S PROJECT NO:

CONTRACT FOR:

CONTRACT DATE:

PROJECT :
(name, address)

State of:

County of:

The undersigned hereby certified that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of payment noted above.
2. Separate Release or Waivers of Liens from Subcontractors and material and equipment suppliers accompanied by a list thereof.

CONTRACTOR:

Address:

BY:

Subscribed and Sworn to before me this
day of 20

Notary Public:

My Commission Expires:

CONTRACTOR'S
INTERIM AFFIDAVIT OF
PAYMENT OF DEBTS AND CLAIMS

City of Jersey City
280 Grove Street
Jersey City, New Jersey 07302

ARCHITECT'S PROJECT NO:

CONTRACT FOR:

CONTRACT DATE:

PROJECT :
(name, address)

State of:

County of:

The undersigned hereby certified that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered for the period of _____ to _____ represented in payment no. _____ .

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of payment noted above.
2. Separate Release or Waivers of Liens from Subcontractors and material and equipment suppliers accompanied by a list thereof.

CONTRACTOR:

Address:

BY:

Subscribed and Sworn to before me this
day of 20

Notary Public:

My Commission Expires:

SUPPLEMENTARY CONDITIONS

1. EXAMINATION OF SITES:

Every prime and sub-contract bidder shall study the conditions at the site(s) thoroughly before submitting his bid. No allowance for extra charges will be permitted because of lack of knowledge of all conditions peculiar thereto except such conditions as are indeterminable before the commencement of the work.

2. CHARGE OF SITES:

The contractor shall take the site as found, and shall assume charge of his work throughout the site until completion and acceptance of project by the Architect/Engineer.

The contractor shall cooperate fully and coordinate his work with the City, all utility companies, and all other contractor(s) so that all work is completed on time, with good workmanship and in a harmonious and efficient manner.

The contractor shall be responsible for the security of all his materials, equipment, facilities within the confines of the site.

It shall be the responsibility of the contractor to provide all necessary work of a permanent or temporary nature to safeguard public and construction site.

Work scheduling shall take into full consideration the requirements of the City with respect to minimal disruption of existing functions by demolition and alterations, including the following:

a. Electrical, gas, water, telephone and drainage services.
b. Accessibility to existing areas.
c. Parking areas.
d. Accessibility by City Maintenance Crews.
e. Safety of park patrons.
f. Noise of demolition and construction operations.

The scheduling of shutdowns and other interruptions of existing utilities shall have the approval of the Owner. No shutdowns will be allowed without prior clearance. Shutdown time shall be held to a minimum.

The time and date agreed upon for shutdown periods shall occur during hours approved by the Owner. The performance of this work at such times shall not result in additional expense to the City.

3. PROTECTION OF PERSONS AND PROPERTY:

This bidder shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with his work. The bidder shall take all reasonable precautions for the safety of and shall provide all reasonable protection to prevent damage, injury, or loss to:

1. All employees on the site and all other persons who may be affected thereby.

2. Other property at the site or adjacent thereto, including interiors and exteriors of the buildings, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation, or replacement in the courses of construction.

The bidder shall comply with all applicable laws, ordinances, rules, regulations, and lawful orders of any public authority having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss. He shall erect and maintain, as required by existing conditions and progress of the work, all reasonable safeguards for safety and protection,
including precaution against fire, erection of solid fencing, posting of danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent utilities. He shall designate a responsible member of his organization at the site, whose duty shall be the prevention of accidents.

Material Safety Data Sheets (MSDS) must be filed with the designated city personnel and copy to the architect, a minimum of ten (10) days prior to any material being brought onto the site. Failure to file MSDS will result in rejection of the material by the city inspector and it will not be permitted on the site.

No requirement of or omission to this Contract shall be deemed to limit or impair any responsibilities or obligations assumed by the contractor under or in connection with this contract.

All debris and waste resulting from the performance of the work shall be removed in such a manner as to prevent damage to all existing and new construction, and shall be legally disposed of by the contractor at his expense at the end of each day. Stockpiling of debris and waste is not permitted.

When the work is in progress, the contractor shall protect the areas directly below and/or around the work areas with yellow traffic cones. This bidder shall not load or permit any part of the work to be loaded so as to endanger its safety.

Fire protection during the contractor's activity shall be provided by installation of a minimum of two (2) chemical fire extinguishers on the site.

The contractor shall, at his own expense, make good any damage, direct or indirect that may be done in the course of the performance of the work by him or his subcontractor to any utility structure or municipal facility, or to newly completed work, through or by reason of the performance of the work.

SUPPLEMENTARY CONDITIONS

4. TEMPORARY WORK AND SERVICES:

The contractor shall provide all materials, labor and equipment necessary to perform all work of a general or temporary nature as required for the complete construction of the project, all as shown on the accompanying drawings and as specified herein.

All Temporary Work and Services shall be maintained in an acceptable condition for the duration of the project and until removal is authorized. At the end of the project, or as directed, the contractor shall remove all temporary work and services and dispose of all materials off site. Cost of all work plus cost of operating and maintaining temporary services shall be included in the contract price.

Temporary Stairs, Runways, etc.: The contractor shall design and provide the necessary temporary stairs, ladders, runways, platforms, scaffolding, floors, etc. that may be required. All such temporary structures shall be of adequate strength for the purposes for which they are constructed.

Temporary Light and Power: Where necessary, the contractor shall provide at his own expense, suitable power facilities and the temporary lighting required for the proper prosecution of the work.

5. PRODUCT HANDLING, STORAGE AND DELIVERY:

The contractor shall arrange for the timely and orderly delivery of all materials and shall be responsible for their proper handling and protection.

Materials and equipment may be stored on the site, but the protection of same shall be the contractor's responsibility. In storing materials within the site, the contractor shall consult with the Owner.

Deliver material in manufacturer's original, unopened containers and rolls with labels intact and legible, to be inspected by Inspector. Deliver materials in sufficient quantity to allow continuity of work.

Store all materials on clean raised platforms. Store rolled goods on end. Handle rolled goods so as to prevent damage to edge or ends.

Provide continuous water protective covering for those materials which require protection against wetting and moisture absorption. Protect materials against damage by construction traffic. Remove damaged materials from construction site.

The contractor will not be permitted to store any petroleum products or any other flammable materials at the construction site.

The materials and equipment not to be stored at the work site shall be removed from the site and stored in the area designated for the contractor's use prior to the end of each work day. Access to work areas with equipment and material will be approved by the Architect prior to any work.

SUPPLEMENTARY CONDITIONS

6. PROGRESS SCHEDULE AND COST BREAKDOWN:

The Contractor shall submit to the Architect a Progress Schedule and cost Breakdown for approval as described in Article GC-33, of the General Conditions.

The cost breakdown shall generally follow the division of trades in the Technical Specifications. Should any trade amount exceed $10,000., this trade shall be subdivided into finer cost breakdowns as to meet the Architects/Engineers approval.

7. RECORD DRAWINGS

The Record Drawings (Section 01700, Item 1.5 B) shall be reviewed the same day as the request for payment during the course of the Work. Payment will not be made unless all work which varies substantially or requires precise measurement has been transferred to the Record Drawings.

8. CLEANING UP:

The contractor shall keep the site free from all surplus material, dirt and rubbish at all times. At the completion of the work, he shall remove all waste materials and rubbish from and about the project and shall remove all paint and/or bituminous spots from new and existing surrounding surfaces.

Spaces where construction work is in progress and all the adjacent areas shall be broom cleaned and free of refuse, rubbish, scrap material or debris at the end of each work day.

In addition to general broom cleaning, the following cleaning shall be done at completion of work: remove marks, stains, fingerprints, other soil and dirt from all surfaces affected by this project; clean out all new and existing drainage structures constructed and/or affected in any way by the work of this contract.

9. PUNCH LIST:

Near the completion of the project, upon the contractor's notification, the Architect and Engineer will inspect the work, and prepare one or more punch lists of work that needs to be corrected. The contractor shall have the work on the punch list corrected by the respective trades to conform to the contract documents, shall check the work, and shall notify the Architect when the punch list items are properly corrected.

The final payment shall not be released until all corrective work is completed and approved by the Architect.

END OF SUPPLEMENTARY CONDITIONS

SUPPLEMENTARY CONDITIONS

SECTION 01100 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Project consists of exterior site work at the Van Wagenen / Apple Tree House. The property is listed as a historic site at the local, state and national levels:

1. Project Location: 298 Academy Street, Jersey City, NJ 07306
2. Owner: City of Jersey City, 280 Grove Street, Jersey City, New Jersey 07302

B. Architect Identification: The Contract Documents, dated March 30, 2015, were prepared for Project and by the City of Jersey City, Division of Architecture by their consultants, HMR Architects and their consultants Arnold Associates - Landscape; and 50 States Engineering - Site/Civil.

C. The Work consists of:

1. The Work includes (but is not limited to):
   a. Construction of new site wall, metal fencing, and metal gates along Academy Street.
   b. Installation of new stamped concrete sidewalk.
   c. Installation of new parking lot with security gate and cobblestone paver driveway.
   d. Construction of new wood fencing along side and rear property.
   e. Re-grading and landscaping.
   f. Construction of new site lighting.
   g. Installation of site furnishings.
   e. Installation of new flagpole with pole-mounted lighting.
   f. Installation of new intercom and card reader at security gate.

1.3 CONTRACT

A. Project will be constructed under a single prime contract.

1.4 CONTRACTOR USE OF PREMISES

A. General: Limit use of the premises to work in areas indicated. The public will not have use of any areas within the contract limits until final acceptance by Architect.

1. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction limits until final acceptance by Architect.

2. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials to a location acceptable to Architect. If additional storage is necessary, obtain and pay for such storage off site.

3. Lock automotive type vehicles, such as passenger cars and trucks and other mechanized or motorized construction equipment, when parked and unattended, so as to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running or the ignition key in place.

B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Driveways, Walkways and Entrances: Keep driveways, parking areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances by construction operations.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.5 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy site and existing building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction. Provide and maintain until permanent sidewalks, stairs, etc. are installed.
2. Notify the Owner not less than 3 days in advance of activities that will affect Owner's operations.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 01100

SECTION 01230 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate "A":

1. Provide and install new storage shed with painted cedar siding, wood fascia and trim, wood doors, wood windows, metal roof, metal gutters and downspouts.

2. New electrical work to include new exterior and interior lighting, house panel, and outlets related to new shed.

3. New site work to include new concrete slab floor, foundation, and footings for shed and new brick walk to shed.

Refer to Drawings A-1 and A-2, CE-101, CE-105, and L-1 for information.

END OF SECTION 01230

SECTION 01322 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Periodic construction photographs.
3. Final Completion construction photographs.

B. Related Sections include the following:

1. Division 1 Section 01340 "Submittals" for submitting photographic documentation.
2. Division 1 Section 01732 "Selective Demolition" for photographic documentation before selective demolition operations commence.
3. Division 1 Section 01770 "Closeout Procedures" for submitting digital media as Project Record Documents at Project closeout.

1.3 SUBMITTALS

A. Qualification Data: For firms and persons specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

B. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same label information as corresponding set of photographs.

C. Construction Photographs: Submit a proof set of a minimum of fifteen (15) photographic views within seven (7) days of taking photographs. Six (6) to ten (10) photographs for each phase or as further described will be selected to be printed and submitted for record.

1. Format: 8-by-10-inch smooth-surface matte prints on single-weight commercial-grade photographic paper, enclosed back to back in clear plastic sleeves that are punched for standard 3-ring binder.
2. Identification: On back of each print, provide an applied label or rubber-stamped impression with the following information:

    a. Name of Project.
    b. Name and address of photographer.
    c. Name of Architect.
    d. Name of Contractor.
    e. Date photograph was taken if not date stamped by camera.
    f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
    g. Unique sequential identifier.

3. Digital Images: Submit a complete set of digital image electronic files with each submittal of prints as a Project Record Document on CD-ROM. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.

1.4 QUALITY ASSURANCE

A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.

1.5 COORDINATION

A. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities, including temporary lighting required to produce clear, well-lit photographs without obscuring shadows.

1.6 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to Jersey City Division of Architecture (JCA) for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in uncompressed TIFF format, produced by a digital camera with minimum sensor size of 16.0 megapixels, and at an image resolution of not less than 3872 by 2592 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. Photographer: Engage a qualified commercial photographer to take construction photographs.

B. Available Photographer:

1. Subject to compliance with requirements, photographer offering services that may be used include, but is not limited to, the following:

   a. Zbig Jedrus Photography
      100 Montgomery Street
      Jersey City, New Jersey 07302

C. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

D. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in filename for each image.
2. Field Office Images: Maintain one set of images on CD-ROM in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Architect.

E. Preconstruction Photographs: Before commencement of demolition and before starting construction, take digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Construction Manager.

1. Flag construction limits before taking construction photographs.
2. Take six 6 photographs to show existing conditions adjacent to property before starting the Work.

3. Take eight 8 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

F. Periodic Construction Photographs: Take 15 digital photographs monthly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

G. Final Completion Construction Photographs: Take 15 color photographs after date of Substantial Completion for submission as Project Record Documents. Construction Manager will direct photographer for desired vantage points.

1. Do not include date stamp.

H. Additional Photographs: Architect or Owner may issue requests for additional photographs, in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.

1. Three days' notice will be given, where feasible.
2. In emergency situations, take additional photographs within 24 hours of request.
3. Circumstances that could require additional photographs include, but are not limited to, the following:

    a. Special events planned at Project site.
    b. Immediate follow-up when on-site events result in construction damage or losses.
    c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
    d. Substantial Completion of a major phase or component of the Work.
    e. Extra record photographs at time of final acceptance.
    f. Owner's request for special publicity photographs.

END OF SECTION 01322

SECTION 01340 - SUBMITTALS

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

A. This section specifies the general methods and requirements of submissions applicable to the following work-related submittals: Shop Drawings, Product Data and Samples.

1.2 SHOP DRAWINGS, PROJECT DATA, SAMPLES

A. Shop Drawings

1. Shop drawings as specified in individual work sections include, but are not necessarily limited to, data such as fabrication and drawings, scheduled information, setting diagrams, actual shopwork manufacturing instructions, custom templates, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications, as applicable to the Work.

2. All shop drawings submitted by subcontractors for approval shall be sent directly to the Contractor for preliminary checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.

3. The Contractor shall check all subcontractor's shop drawings regarding measurements, size of members, materials and details to satisfy himself that they conform to the intent of the Contract Drawings and Specifications. Drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.

4. All details on shop drawings submitted for approval shall show clearly the elevations of the various parts to the main members and lines of the structure and where correct fabrications of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted for approval.

B. Product Data: As specified in individual sections, these include but are not necessarily limited to standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, and manufacturer's printed statements of compliances and applicability, catalog cuts, product photographs, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare parts listing, and printed product warranties, as applicable to the Work.

C. Samples: Samples specified in individual sections include but are not necessarily limited to physical examples of the work, such as sections of manufactured or fabricated work, of pattern swatches and as applicable to the Work.

1.3 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor shall review shop drawings, product data and samples prior to submission to determine and verify the following:

1. Field measurements,
2. Field construction criteria,
3. Catalog numbers and similar data, and
4. Conformance with the specifications.

B. Each shop drawing, working drawing, sample and catalog data submitted by the Contractor shall have affixed to it the following Certification Statement, signed by the Contractor: "Certification Statement: By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements."

C. Notify the Architect in writing, at the time of submittal, of any deviations in the submittals from the requirements of the contract documents.

D. No portion of the work requiring a shop drawing, working drawing, sample or catalog data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased or on-site construction accomplished which does not conform to approved shop drawings and data shall be at the Contractor's risk. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

E. Project work, materials, fabrication and installation shall confirm with approved shop drawings, working drawings, applicable samples and catalog data.

1.4 SUBMISSION REQUIREMENTS

A. Make submittals promptly in accordance with approved schedule and in such sequence as to cause no delay in the Work or in the work of any other Contractor.

B. Number of submittals required:

1. Shop Drawings: Submit six (6) copies.
2. Product Data: Submit six (6) copies.
3. Samples: Submit the number stated in the respective Specification Sections.

C. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.

2. The project title and number.

3. Contractor identification.

4. The names of:
   a. Contractor
   b. Supplier
   c. Manufacturer

5. Identification of the product, with the specification section number.

6. Field dimensions, clearly identified as such.

7. Relation to adjacent or critical features of the Work or materials.

8. Applicable standards, such as ASTM or Federal Specification numbers.

9. Identification of deviations from Contract Documents.

10. Identification of revisions of re-submittals.

11. A 3 inch x 3-inch blank space for Contractor and Engineer stamp.

1.5 RESUBMISSION REQUIREMENTS

A. Make any corrections or changes in the submittals required by the Architect and resubmit until approved.

B. Shop Drawings and Product Data:

1. Revise initial drawings or data and resubmit as specified for the initial submittal.

2. Indicate any changes that have been made other than those requested by the Architect.

C. Samples: Submit new samples as required for initial submittal.

1.6 DISTRIBUTION

A. Distribute reproductions of approved shop drawings and copies of approved product data and samples, where required, to the job site file and elsewhere as directed by the Architect. Number of copies shall be as directed but shall not exceed six (6).

1.7 GENERAL PROCEDURES FOR SUBMITTALS

A. Coordination of Submittals: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work sections of the Specifications, so that the installation will not be delayed by processing times including disapproval and re-submittal (if required), coordination with other submittals, testing, purchasing, fabricating, delivery and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the work.

1.8 WORKMANSHIP BONDS

A. General: Where specific units of work require the issuance of a bond or similar provision, as a means of assuring the Owner that certain possible failures of the work to perform as represented will be rectified at someone else's expense, submit fully executed bond backed by a surety company acceptable to the Owner and in the principal amount indicated. Include information sheet for the Owner's maintenance/operating personnel outlining proper procedures in case of failure or other instances which might affect the validity of the bond; list names, addresses and telephone numbers for the Owner's emergency and follow-up in connection with the implementation of each bond.

PART 2 - PRODUCTS - Not applicable.

PART 3 - EXECUTION - Not applicable.

END OF SECTION 01340

SECTION 01351 - SPECIAL PROCEDURES FOR HISTORIC TREATMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes special procedures for historic treatment on Project including, but not limited to, the following:

1. Storage and protection of existing historic materials.
2. Temporary protection of historic materials during construction.
3. Protection during application of chemicals.
4. Protection during use of heat-generating equipment.
5. Historic treatment procedures.

B. Related Sections include the following:
1. Division 1 Section 01322 “Photographic Documentation”

1.3 DEFINITIONS

A. "Preservation": To apply measures necessary to sustain the existing form, integrity, and materials of a historic property. Work may include preliminary measures to protect and stabilize the property.

B. "Rehabilitation": To make possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features that convey its historical, cultural, or architectural values.

C. "Restoration": To accurately depict the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and the reconstruction of missing features from the restoration period.

D. "Reconstruction": To reproduce in the exact form and detail a building, structure, or artifact as it appeared at a specific period in time.

E. "Stabilize": To apply measures designed to reestablish a weather-resistant enclosure and the structural reinforcement of an item or portion of the building while maintaining the essential form as it exists at present.

F. "Protect and Maintain": To remove deteriorating corrosion, reapply protective coatings, and install protective measures such as temporary guards; to provide the least degree of intervention.

G. "Repair": To stabilize, consolidate, or conserve; to retain existing materials and features while employing as little new material as possible. Repair includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials. Within restoration, repair also includes limited replacement in kind, rehabilitation, and reconstruction, with compatible substitute materials for deteriorated or missing parts of features when there are surviving prototypes.

H. "Replace": To duplicate and replace entire features with new material in kind. Replacement includes the following conditions:

1. Duplication: Includes replacing elements damaged beyond repair or missing. Original material is indicated as the pattern for creating new duplicated elements.
2. Replacement with New Materials: Includes replacement with new material when original material is not available as patterns for creating new duplicated elements.
3. Replacement with Substitute Materials: Includes replacement with compatible substitute materials. Substitute materials are not allowed, unless otherwise indicated.

I. "Remove": To detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

J. "Remove and Salvage": To detach items from existing construction and deliver them to Owner.

K. "Remove and Reinstall": To detach items from existing construction, repair and clean them for reuse, and reinstall them where indicated.

L. "Existing to Remain" or "Retain": Existing items of construction that are not to be removed and that are not otherwise indicated to be removed and salvaged, or removed and reinstalled.

M. "Material in Kind": Material that matches existing materials, as much as possible, in species, cut, color, grain, and finish.

1.4 SUBMITTALS

A. Alternative Methods and Materials: If alternative methods and materials to those indicated are proposed for any phase of work, provide a written description including evidence of successful use on other, comparable projects, and program of testing to demonstrate effectiveness for use on this Project.

B. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by historic treatment operations. Submit before work begins.

1.5 QUALITY ASSURANCE

A. Historic Treatment Specialist Qualifications: A firm that employs personnel, including supervisory personnel, experienced and skilled in the processes and operations indicated.

B. Historic Treatment Preconstruction Conference: Conduct conference at Project site to identify materials, methods and equipment to be used for work related to Historic materials. Include processes for protection of surrounding materials during operations.

1.6 STORAGE AND PROTECTION OF HISTORIC MATERIALS

A. Removed and Salvaged Historic Materials:

1. Clean salvaged historic items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.
6. Do not dispose of items removed from existing construction without prior written consent of Owner.

B. Removed and Reinstalled Historic Materials:

1. Clean and repair historic items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

C. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling during historic treatment. When permitted by Architect, items may be removed to a suitable, protected storage location during historic treatment and reinstalled in their original locations after historic treatment operations are complete.

D. Storage and Protection: When removed from their existing location, store historic materials within a weathertight enclosure where they are protected from wetting by rain, snow, or ground water, and temperature variations. Secure stored materials to protect from theft.

1. Identify removed items with an inconspicuous mark indicating their original location.

1.7 PROJECT-SITE CONDITIONS

A. Exterior Cleaning and Repairing:

1. Proceed with the work only when forecasted weather conditions are favorable.

a. Wet Weather: Do not attempt repairs during rainy or foggy weather. Do not apply primer, paint, putty, or epoxy when the relative humidity is above 80 percent. Do not remove exterior elements of structures when rain is forecast or in progress.
b. Do not perform exterior wet work when the air temperature is below 40 deg F (5 deg C).
c. Do not begin cleaning, patching, or repairing when there is any likelihood of frost or freezing.
d. Do not begin cleaning when either the air or the surface temperature is below 45 deg F (7 deg C) unless approved means are provided for maintaining a 45 deg F (7 deg C) temperature of the air and materials during, and for 48 hours subsequent to, cleaning.

2. Perform cleaning and rinsing of the exterior only during daylight hours.

B. Open Flame work:

1. Open flame work will not be permitted.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PROTECTION, GENERAL

A. Comply with manufacturer's written instructions for precautions and effects of products and procedures on adjacent building materials, components, and vegetation.

B. Ensure that supervisory personnel are present when work begins and during its progress.

C. Temporary Protection of Historic Materials during Construction:

1. Protect existing materials during installation of temporary protections and construction. Do not deface or remove existing materials.

2. Attachments of temporary protection to existing construction shall be approved by Architect prior to installation.

D. Protect landscape work adjacent to or within work areas as follows:

1. Provide barriers to protect tree trunks.
2. Bind spreading shrubs.
3. Use coverings that allow plants to breathe and remove coverings at the end of each day. Do not cover plant material with a waterproof membrane for more than 8 hours at a time.
4. Set scaffolding and ladder legs away from plants.

3.2 PROTECTION DURING APPLICATION OF CHEMICALS

A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm or damage resulting from applications of chemical cleaners and paint removers.

B. Comply with requirements in Division 1 Section "Temporary Facilities and Controls."

C. Cover adjacent surfaces with materials that are proven to resist chemical cleaners selected for Project unless chemicals being used will not damage adjacent surfaces. Use covering materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.

D. Do not clean surfaces during winds of sufficient force to spread cleaning solutions to unprotected surfaces.

E. Neutralize and collect alkaline and acid wastes and dispose of off Owner's property.

F. Dispose of runoff from chemical operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

3.3 OPEN-FLAME WORK

A. Heat-generating equipment utilizing an open flame shall not be permitted.

3.4 HISTORIC TREATMENT PROCEDURES

A. The principal aim of preservation work is to halt the process of deterioration and stabilize the item's condition, unless otherwise indicated. Repair is required where specifically indicated. The following procedures shall be followed:

1. Retain as much existing material as possible; repair and consolidate rather than replace.
2. Use additional material or structure to reinforce, strengthen, prop, tie, and support existing material or structure.
3. Use reversible processes wherever possible.
4. Use traditional replacement materials and techniques. New work shall be distinguishable to the trained eye, on close inspection, from old work.
5. Record the work before the procedure with preconstruction photos and during the work with periodic construction photos. Photographic documentation is specified in Division 1 Section "Photographic Documentation."

B. Prohibit smoking by personnel performing work on or near historic structures.

C. Obtain Architect's review and written approval in the form of a Constructive Change Directive or Supplemental Instruction before making changes or additions to construction or removing historic materials.

D. Notify Architect of visible changes in the integrity of material or components whether due to environmental causes including biological attack, UV degradation, freezing, or thawing; or due to structural defects including cracks, movement, or distortion.

1. Do not proceed with the work in question until directed by Architect.

E. Where missing features are indicated to be repaired or replaced, provide features whose designs are based on accurate duplications rather than on conjectural designs, subject to the approval of Architect and Historic Treatment Specialist.

F. Where Work requires existing features to be removed, cleaned, and reused, perform these operations without damage to the material itself, to adjacent materials, or to the substrate.

G. Identify new or replacement materials and features with inconspicuous, permanent marks to distinguish them from original materials. Record the legend of identification marks and the locations of these marks on Record Drawings.

H. When cleaning, match samples of existing materials that have been cleaned and identified for acceptable cleaning levels. Avoid overcleaning to prevent damage to existing materials during cleaning.

END OF SECTION 01351

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.

B. Temporary utilities include, but are not limited to, the following:

1. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
2. Electric power service.
3. Lighting.
4. Telephone service.

C. Support facilities include, but are not limited to, the following:

1. Temporary roads and paving.
2. Dewatering facilities and drains, to standards of Section 02240.
3. Project identification and temporary signs (SEE SKETCH AT END OF THIS SECTION).
4. Waste disposal facilities.
5. Field offices.
6. Storage and fabrication sheds.
7. Lifts and hoists.
8. Construction aids and miscellaneous services and facilities.

D. Security and protection facilities include, but are not limited to, the following:

1. Environmental protection.
2. Stormwater control.
3. Tree and plant protection.
4. Site enclosure fence.
5. Security enclosure and lockup.
6. Barricades, warning signs, and lights.
7. Fire protection.

1.3 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:

1. Building code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Police, fire department, and rescue squad rules.
5. Environmental protection regulations.

B. Standards: Comply with NFPA 241 “Standard for Safeguarding Construction, Alterations, and Demolition Operations,” ASNI A10 Series standards for “Safety Requirements for Construction and Demolition.”

C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

D. Electric Service: Comply with NECA, NEMA, and UL Standards and Regulations for temporary electric service.

1.4 PROJECT CONDITIONS

A. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:

1. Keep temporary services and facilities clean and neat.
2. Relocate temporary services and facilities as required by progress of the Work.

B. Removal of Existing Temporary Utilities: Prior to project commencement, and a time mutually agreeable with the Owner, Contractor shall schedule removal of existing temporary electrical utilities and all associated items.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.

B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm) 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide concrete galvanized steel bases for supporting posts.

C. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.

D. Water: Potable.

2.2 EQUIPMENT

A. General: Provide equipment suitable for use intended.

B. Field Offices: Room # 106 of the house will be used as field office for the project. Office is for the express use of the Division of Architecture, their consultants, and representatives. Office shall not be used for Contractor use or storage.
Provide the following for office construction:

1. **Room # 106 floor to be cleaned, foam underlayment installed with 1/8 masonite over foam. Seams to be taped and floor protection to be maintained throughout final payment of project. Prior to final payment or as directed by owner, remove and dispose of floor protection, with final cleaning of floor. Failure to complete this task shall result in a negotiated credit to the Owner on the first payment application request.**

C. Equipment:

1. Provide fax/copier/scanner throughout construction period for use by City personnel engaged in construction activities.

2. Two (2) Microsoft Office on CD-ROM with applicable licenses and updates.

3. Two (2) cell phones (I-Phone 5s or equivalent) with service from major service provider, including voicemail, unlimited data and Caller ID, case and clip, stationary and mobile chargers, through final payment of project.

4. Two (2) Verizon mobile hotspot, 4G LTE with service through final payment of project.

5. Two (2) Adobe Reader (latest version) on CD-ROM with applicable licenses and updates.

6. Two (2) Dell Latitude 14, 3000 series Laptops with Windows 7 Pro.

A. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and

size required by location and class of fire exposure.

B. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

C. Drinking-Water Fixtures: Drinking-water fountains Containerized, tap-dispenser, bottled-water drinking-water units and service, including paper cup supply.

1. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F (7.2 to 12.7 deg C).

D. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

2. Heating Units: Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed.

E. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.

F. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITIES

A. General: Engage appropriate local utility company to install or transfer temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment.

Comply with utility company recommendations.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.

3. Use Charges: Cost or use charges for temporary facilities are the responsibility of the General Contractor not chargeable to the Owner or Architect. Neither the Owner nor Architect will accept cost or use charges as a basis of claims for a Change Order.

B. Water Service: Use of Owner's existing exterior water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

1. Provide rubber hoses as necessary to serve Project site.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.

1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.

2. Drinking-Water Facilities: Provide bottled-water, drinking-water units.

   a. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F (7.2 to 12.7 deg C).

3. Locate toilets and drinking-water fixtures so personnel need not walk more than two stories vertically or 200 feet (60 m) horizontally to facilities.

D. Electric Power Service: Provide weatherproof, grounded electic power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.

1. Install electric power service underground, except where overheard service must be used.
2. Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, ac 20 Ampere rating, and lighting circuits may be nonmetallic sheathed

cable where overhead and exposed for surveillance.

E. Provide two (2) cellular phones with chargers with unlimited usage for the Jersey City Inspectors and Project Managers use during the contract limit through final payment. Turn over activated phones at Pre-Construction Meeting. Include carrying cases or clips along with an automobile charging cord. Phones to be I Phone 5S with unlimited voice and data plans.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
   1. Locate storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.

   2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Traffic Controls: Provide temporary traffic controls at junction of temporary roads with public roads. Include warning signs for public traffic and "STOP" signs for entrance onto public roads. Comply with requirements of authorities having jurisdiction.

   1. Coordinate with the City's Traffic Engineering Department and JCPD.

   2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Dewatering Facilities and Drains: Comply with requirements in applicable Division 2 Sections for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, use same facilities. Maintain Project site, excavations, and construction free of water.

D. Project Identification and Temporary Signs: Prepare Project identification and other signs in sizes indicated (See sketch at the end of this section). Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.

   1. Engage an experienced sign painter to apply graphics for Project identification signs. Comply with details indicated.

   2. Prepare temporary signs to provide directional information to construction personnel and visitors.

E. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.

1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.

2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 sq. ft. (2.3 sq. m) or less with plywood or similar materials.

3. Close openings through floor or roof decks and horizontal surfaces with loadbearing, wood-framed construction.

4. Where temporary wood or plywood enclosure exceeds 100 sq. ft. (9.2 sq. m) in area, use UL-labeled, fire-retardant-treated material for framing and main sheathing.

G. Parking: Provide on-site parking for J.C. Inspector and Project Manager, throughout construction period.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site.

B. Stormwater Control: Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of stormwater from heavy rains.

C. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from construction damage. Protect tree root systems from damage, flooding, and erosion.

D. Maintenance of Existing Site Enclosure Fence: Before construction operations begin, Contractor shall assume responsibility of the existing install portable chain-link enclosure fence with lockable entrance gates.

E. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

F. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where

appropriate and needed, provide lighting, including flashing red or amber lights.

1. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch- (16-mm-) thick exterior plywood.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
2. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. Utilities: Engage and schedule appropriate local utility company to remove existing temporary utilities.
4. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1 Section "Closeout Procedures."

END OF SECTION 01500

VAN WAGENEN / APPLE TREE HOUSE

PHASE III

CITY OF JERSEY CITY

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MAYOR

ROLANDO R. LAVARRO JR.
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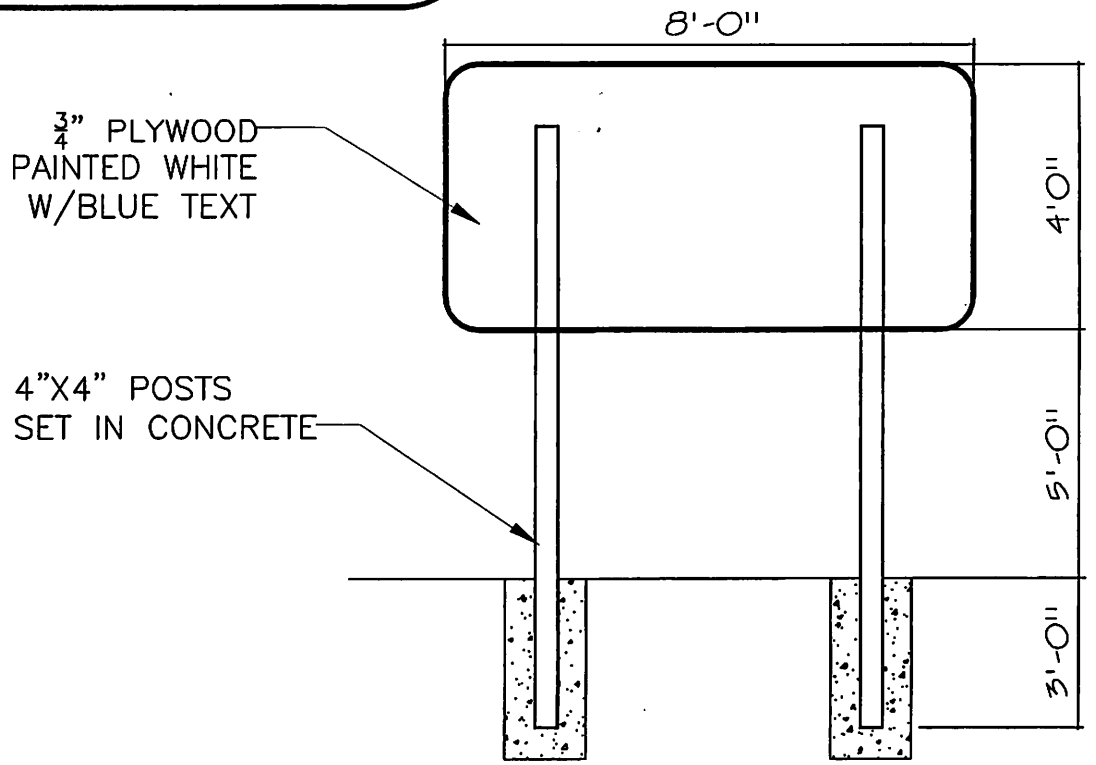

SECTION 01732 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general conditions of the Contract, including Instructions to Bidders, General Conditions, Supplementary Conditions, and other Division 1 Specification sections, apply to the work of this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of building or structure.
2. Salvage of existing items to be reused or recycled.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate detailed sequence of selective demolition and removal work, with starting and ending dates for each activity, interruption of utility services, use of elevator and stairs, and locations of temporary partitions and means of egress.

B. Predemolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

1.5 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI A10.6 and NFPA 241.

D. Predemolition Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Owner will continue to use areas, walks, driveways and parking areas immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.

E. Historic Items, relics, and similar objects including, but not limited to commemorative plaques and tablets, antiques, and other items of interest or value to the Owner that may be encountered during selective demolition remain Owner’s property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

F. Storage or sale of removed items or materials on-site is not permitted.

G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.7 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.

F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off indicated utilities with utility companies.
2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Division 1 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

3.4 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations. Notify Owner prior to any open flame operations.
4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
5. Dispose of demolished items and materials promptly

B. Reuse of Building Elements: Project allows for reuse of building elements. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them.

B. Burning: Do not burn demolished materials.

3.6 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 01732

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Project Record Documents.
3. Operation and maintenance manuals.
4. Warranties.
5. Instruction of Owner's personnel.
6. Final cleaning.

B. Related Sections include the following:

1. Division 1 Section 01322 "Photographic Documentation" for submitting Final Completion construction photographs and negatives.
2. Divisions 2 through 9 Sections for specific closeout and special cleaning requirements for products of those Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
3. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

4. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
5. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
6. Complete startup testing of systems.
7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
8. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three (3) copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major element.
3. Include the following information at the top of each page:

a. Project name.
b. Date.
c. Name of Architect.
d. Name of Contractor.
e. Page number.

1.6 PROJECT RECORD DOCUMENTS

A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

B. Record Drawings: Maintain and submit one set of blue- or black-line white prints of Contract Drawings and Shop Drawings.

1. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
b. Accurately record information in an understandable drawing technique.
c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.

2. Mark record sets with erasable, red-colored pencil. Use other colors to

distinguish between changes for different categories of the Work at the same location.

3. Mark important additional information that was either shown schematically or omitted from original Drawings.
4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.
5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.
6. At a time near the completion of the work, arrange and pay for reproduction firm with document loss insurance coverage to secure original drawings from Architect to make one complete set of mylar transparencies of all drawings included in this contract. Carefully transfer all changes shown on the record drawings to the corresponding mylars. Call attention to each change entry by drawings neatly in a crisp pen or pencil. Submit full set of mylars as a record document. Original drawings to be returned to the architect by the reproduction firm.

C. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications. Mark copy to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Note related Change Orders and Record Drawings where applicable.

D. Miscellaneous Record Submittals: Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

1.7 OPERATION AND MAINTENANCE MANUALS

A. Assemble a complete set of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual Specification Sections and as follows:

1. Operation Data:

a. Emergency instructions and procedures.
b. System, subsystem, and equipment descriptions, including operating standards.

c. Operating procedures, including startup, shutdown, seasonal, and weekend operations.
d. Description of controls and sequence of operations.
e. Piping diagrams.

2. Maintenance Data:

a. Manufacturer's information, including list of spare parts.
b. Name, address, and telephone number of Installer or supplier.
c. Maintenance procedures.
d. Maintenance and service schedules for preventive and routine maintenance.
e. Maintenance record forms.
f. Sources of spare parts and maintenance materials.
g. Copies of maintenance service agreements.
h. Copies of warranties and bonds.

B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.

1.8 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (115-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

D. Provide a “Summary of Warranties” in the format attached to the back of this Section.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to areas.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove labels that are not permanent.
h. Touch up and otherwise repair and restore marred, exposed finishes and surfaces.

Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

i. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01770

SECTION 02230 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Protecting existing trees and vegetations to remain.
2. Removing existing trees and other vegetations.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and abandoning site utilities in place.
7. Temporary erosion and sedimentation control measures.

B. Related Sections include the following:

1. Division 1 Section "Temporary Facilities and Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities and temporary erosion and sedimentation control procedures.
2. Division 1 Section "Selective Demolition" for partial demolition of buildings or structures undergoing alterations.
3. Division 2 Section "Earthwork" for soil materials, excavating, backfilling, and site grading.
4. Division 2 Section "Finish Grading and Lawns" for finish grading including preparing and placing planting soil mixes and testing of topsoil material.

1.3 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

B. Record drawings, according to Division 1 Section "Project Record Documents," identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.7 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Contractor shall notify adjoining property owner for removals and/or work on adjoining property.

C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

D. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

E. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 2 Section "Earthwork."

1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly flag trees and vegetation to remain or to be relocated.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE PROTECTION

A. If any tree is marked to remain by Architect, erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.

1. Do not store construction materials, debris, or excavated material within fenced area.
2. Do not permit vehicles, equipment, or foot traffic within fenced area.
3. Maintain fenced area free of weeds and trash.

B. Do not excavate within tree protection zones, unless otherwise indicated.

C. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

1. Cover exposed roots with burlap and water regularly.

2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
3. Coat cut faces of roots more than 1-1/2 inches (38 mm) in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
4. Backfill with soil as soon as possible.

D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by the Architect.

1. Employ an arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the Architect.

3.4 UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.

1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.
2. Owner will arrange to shut off indicated utilities when requested by Contractor.

C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without the Construction Manager written permission.

D. Excavate for and remove underground utilities indicated to be removed.

E. Removal of underground utilities is included in Division 2 Sections covering site utilities.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches (450 mm) below exposed subgrade.
4. Use only hand methods for grubbing within tree protection zone.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
2. Do not stockpile topsoil within tree protection zones.
3. Dispose of excess topsoil as specified for waste material disposal.
4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing, full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

3.8 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION 02230

SECTION 02240 - DEWATERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes construction dewatering.

B. Related Sections include the following:

1. Division 2 Section "Excavation Support and Protection."
2. Division 2 Section "Earthwork" for excavating, backfilling, site grading and for site utilities.

1.3 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control ground-water flow into excavations and permit construction to proceed on dry, stable subgrades.

1. Maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
2. Prevent surface water from entering excavations by grading, dikes, or other means.
3. Accomplish dewatering without damaging existing buildings adjacent to excavation.
4. Remove dewatering system if no longer needed.

1.4 SUBMITTALS

A. Shop Drawings for Information: For dewatering system. Show arrangement, locations, and details of wells and well points; locations of headers and discharge lines; and means of discharge and disposal of water.

1. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
2. Include a written report outlining control procedures to be adopted if dewatering problems arise.
3. Include Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.

B. Qualification Data: For the Installer

C. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.

D. Record drawings at Project closeout identifying and locating capped utilities and other subsurface structural, electrical, or mechanical conditions performed during dewatering.

1. Note locations and capping depth of wells and well points.

E. Field Test Reports: Before starting excavation, submit test results and computations demonstrating that dewatering system is capable of meeting performance requirements.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with water disposal requirements of authorities having jurisdiction.

B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

B. Project-Site Information:

1. Make additional test borings and conduct other exploratory operations necessary for dewatering.

C. Survey adjacent structures and improvements, employing a qualified professional engineer or land surveyor, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During dewatering, regularly resurvey benchmarks , maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

3.2 INSTALLATION

A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed, or until dewatering is no longer required.

C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.

1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.

1. Maintain piezometric water level a minimum of 24 inches (600 mm) below surface of excavation.

E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water in a manner

that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.

F. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.

1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches (900 mm) below overlying construction.

G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

3.3 OBSERVATION WELLS

A. Provide, take measurements, and maintain at least the minimum number of observation wells or piezometers indicated and additional observation wells as may be required by authorities having jurisdiction.

B. Observe and record daily elevation of ground water and piezometric water levels in observation wells.

C. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. Suspend construction activities in areas where observation wells are not functioning properly until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.

1. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.

END OF SECTION 02240

SECTION 02260 - EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes excavation support and protection systems.

B. Related Sections include the following:

1. Division 1 Section "Temporary Facilities and Controls."
2. Division 2 Section "Earthwork" for excavating and backfilling.

1.3 PERFORMANCE REQUIREMENTS

A. Design, provide, monitor, and maintain an anchored and braced excavation support and protection system capable of resisting soil and hydrostatic pressure and supporting sidewalls of excavations.

1. Work includes removing excavation support and protection systems when no longer needed.
2. Prevent surface water from entering excavations by grading, dikes, or other means.
3. Install excavation support and protection systems without damaging existing buildings, pavements, and other improvements adjacent to excavation.

1.4 SUBMITTALS

A. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer for excavation support and protection systems. System design and calculations must be acceptable to authorities having jurisdiction.

1. Include Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.

B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Photographs, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by excavation support and protection systems.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing excavation support and protection systems similar to those required for this Project and with a record of successful in-service performance.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where the Project is located and who is experienced in providing engineering services for designing excavation support and protection systems that are similar to those indicated for this Project in material, design, and extent.

1. Engineering Responsibility: Engage a qualified professional engineer to prepare or supervise the preparation of data for the excavation support and protection system including drawings and comprehensive engineering analysis that shows the system's compliance with specified requirements.

1.6 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted in writing by the Architect and then only after arranging to provide temporary utility services according to requirements indicated.

B. Project Site Information:

1. Make additional test borings and conduct other exploratory operations as necessary.

C. Survey adjacent structures and improvements, employing a qualified professional engineer or surveyor; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials need not be new but must be in serviceable condition.

B. Structural Steel: ASTM A 36 (ASTM A 36M).

C. Steel Sheet Piling: ASTM A 328 (ASTM A 328M) or ASTM A 572 (ASTM A 572M)

D. Wood Lagging: Lumber, mixed hardwood, nominal rough thickness of 3 inches (75 mm).

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.

1. Shore, support, and protect utilities encountered.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

C. Locate excavation support and protection systems clear of permanent construction and to permit forming and finishing of concrete surfaces.

D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure excavation support and protection systems remain stable.

E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.2 SOLDIER BEAMS AND LAGGING

A. Install steel soldier piles before stating excavation. Space soldier piles at intervals indicated. Accurately align exposed faces of flanges to vary not more than 2 inches (50 mm) from a horizontal line and not more than 1:120 out of vertical alignment.

B. Install wood lagging within flanges of soldier piles as excavation proceeds. Trim excavation as required to install lagging. Fill voids behind lagging with soil, and compact.

C. Install wales horizontally at centers indicated and secure to soldier piles.

3.3 SHEET PILING

A. Install one-piece sheet piling and tightly interlock to form a continuous barrier. Accurately align exposed faces of sheet piling to vary not more than 2 inches (50 mm) from a horizontal line and not more than 1:120 out of vertical alignment. Cut tops of sheet piling to uniform elevation at top of excavation.

3.4 TIEBACKS

A. Tiebacks: Drill for, install, tension, and grout tiebacks into position. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.

3.5 BRACING

A. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move a brace, install new bracing before removing original brace.

1. Do not place bracing where it will be cast into or included in permanent concrete work, unless otherwise approved by Architect.
2. Install internal bracing, if required, to prevent spreading or distortion of braced frames.
3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.6 REMOVAL AND REPAIRS

A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils and damaging structures, pavements, facilities, and utilities.

1. Remove excavation support and protection systems to a minimum depth of 48 inches (1200 mm) below overlying construction and abandon remainder.
2. Repair or replace, as approved by Architect, adjacent work damaged or displaced by removing excavation support and protection systems.

B. Leave excavation support and protection systems permanently in place.

END OF SECTION 02260

SECTION 02270 – SOIL EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Under this section, the Contractor shall provide all labor, equipment and material necessary to control soil erosion resulting from construction operations and prevent excessive flow of sediment from the construction site, as shown on the Contract Drawings or as specified herein and approved by the Construction Manager. The Contractor shall perform all work required, such work may include the installation of water diversion structures, diversion ditches and sediment basins and seeding, mulching or sodding critical areas to provide temporary protection.

B. In general, work to be included under this section shall include, but not be limited to, the following:

1. Erosion Control
2. Sediment Control
3. Soil Stabilization

C. Related Work Described Elsewhere:

1. Earthwork Section 02350

1.2 QUALITY ASSURANCE

A. Standards:

1. Comply with ANSI, OSHA, ASTM and all applicable Federal, State and local codes including revisions to date of contract.

2. Referenced Specifications:

a. New Jersey Department of Transportation Standard Specifications for Road and Bridge construction, dated 1989, plus addenda when referred to, shall become part of this specification for materials and construction requirements. A referenced Pay Item Number shall serve to describe the required work for this project providing material and construction conforming to all applicable requirements under the NJDOT Specifications except for measurement and payment. The measurement and payment section of the NJDOT Specifications shall **not** apply as all work under this section shall be included in the contractor's lump sum and unit prices bid for this Contract. Where the referenced specifications cites requirements differing from those included in these specifications, the more stringent, highest quality shall govern.

1.3 EROSION CONTROL

A. General: Erosion control procedures shall be utilized along the right-of-way, access roads and stockpile areas as shown on the Contract Drawings or as directed by the Construction Manager. Erosion control shall commence immediately and shall be maintained for the entire duration of the project.

1. The Contractor shall control erosion during all phases of construction, as shown on the Contract Drawings or as directed by the Construction Manager. When no work shall be performed for more than 10 days, work areas shall be protected by temporary seeding, mulching, sodding or the slope lengths shall be reduced by the installation of diversions or other means. When topography permits, debris basins shall be constructed at points of water concentration from critical areas that will remain unprotected longer than 10 days. Earth berms or diversions shall be constructed to intercept and divert runoff water away from critical areas. Diversion outlets shall be stable or shall be stabilized by paving or other means acceptable to the Construction Manager.

1.4 SEDIMENT CONTROL

A. General: To allow sediment to settle out of water that interferes with construction before such water enters any surface waters, dewatering operations shall direct pumpage as far from the stream bank or receiving water as possible. Care should be taken not to damage or kill vegetation by excessive watering or by damaging silt accumulation in the discharge area. Settling basins shall be constructed and used as specified by the Construction Manager where necessary to protect vegetation and to achieve environmental objectives.

B. The selection, design and construction of areas where excess excavated material, material hauled in for roads, access roads and stripped top-soil are to be placed, shall be consistent with environmental objectives and constraints. All such areas shall be approved by the Construction Manager. The stockpiling and dispersal of excess material, disposal of stockpile areas and access routes shall not be permitted within or adjacent to areas where siltation to stream corridors and wetlands could occur.

PART 2 - PRODUCTS

2.1 SEDIMENT CONTROL

A. Silt Fence: Shall consist of Geotextile fabric whose width shall be at least 3 feet to provide for a 2 foot high fence after 1 foot of fabric is buried in the existing soil. Heavy duty silt fence shall consist of Geotextile fabric whose width shall be at least 4 feet to provide for a 3 foot high fence after 1 foot of fabric is buried in the existing soil. Sections of fabric shall be joined in such a manner that, when in operation, the sections work effectively as a continuous fence. Fence posts shall be installed at a slight angle toward the anticipated runoff source.

B. Inlet Filters: Inlet filters, consisting of welded wire mesh and Geotextile fabric, shall be installed to control sedimentation at existing and proposed inlet drainage structures.

1. For existing inlet structures, Geotextile fabric shall be placed under the grates, over the curb pieces and extend a minimum of 6 inches beyond. Coarse aggregate size No. 8 shall be placed behind each curb piece and on the Geotextile fabric to secure the fabric in place.
2. Inlet filters shall be removed the same day as scheduled paving operations.

C. Inlet Sediment Traps: Inlet sediment traps, consisting of silt fence and temporary stone inlets, shall be constructed to control sedimentation at existing and new inlet drainage structures.

1. The silt fence shall consist of Geotextile fabric whose width shall be at least 3 feet to provide for a 2 foot high fence after 1 foot of fabric is buried in the existing soil. Sections of fabric shall be joined in such a manner that, when in operation, the sections work effectively as a

continuous fence. The silt fence shall be installed around the drainage structure and meet into the stone inlets. Fence posts shall be installed at a slight angle toward the anticipated flow.

2. The temporary stone inlets, consisting of coarse aggregate size No. 2, shall be placed in each flow line upgrade of the inlet structure. The coarse aggregate shall be placed on Geotextile fabric which shall be buried in the soil. When sections of Geotextile fabric need to be joined, the sections shall be overlapped a minimum of 18 inches in the direction of flow.

PART 3 - EXECUTION

3.1 DUST AND DIRT CONTROL

A. Dust Control: The Contractor shall employ construction methods and means that keep flying dust to the minimum and shall provide for the laying of water or other dust control materials on the project and on roads, streets and other areas immediately adjacent to the project limits, wherever traffic or buildings that are occupied or in use, are affected by such dust caused by his hauling or other construction operations. The materials and methods used for dust control are subject to approval and shall be as directed.

1. When calcium chloride is used for dust control, the calcium chloride shall be grade 2 in the form of loose dry granules or flakes and be fine enough to feed through commonly used spreaders at a rate of application of approximately 1.5 pounds per square yard. Care shall be exercised when using calcium chloride on steep slopes in order to prevent the calcium chloride from washing into streams or accumulating around plants. Calcium chloride shall not be applied in solution.

B. Dirt Control: The Contractor shall provide for prompt removal from existing roadways of all dirt and other materials that have been spilled, washed, tracked or otherwise deposited thereon by his hauling and other operations whenever the accumulation is sufficient to cause the formation of mud, interfere with drainage, damage pavements or create a traffic hazard.

1. In order to minimize tracking of dirt and other materials onto existing roadways, a construction driveway shall be constructed at locations where vehicles exit a work site.

2. The construction driveway shall consist of a layer of broken stone which shall be a minimum 4 inches thick and 100 feet long where practical and of sufficient width to serve the intended purpose. The broken stone shall be 2 1/2 inch nominal size. The driveway shall be maintained by top dressing with additional stone, as directed, and shall be removed when no longer required.

3.2 SOIL EROSION AND SEDIMENT CONTROL MAINTENANCE

A. Soil erosion and sediment control measures shall be maintained during the construction season as well as during winter months and other times when the project is closed down, throughout the life of the project, to ensure that the measures function properly. Soil erosion and sediment controls shall be immediately inspected after each rain and any corrective work shall immediately be performed to return the soil erosion and sediment control measures to proper function, as directed. Riprap stones, coarse aggregate, silt fence, or haybales damaged due to washouts or siltation shall be replaced as directed.

B. Sediment traps and basins shall be cleaned out when they are 50 percent filled. Silt fences, stone outlet structures, dams, and haybales shall have sediment removed when the sediment reaches 50

percent of the height of the soil erosion and sediment control measure. Sediment removed shall be disposed of in accordance with subsection 202.12.

END OF SECTION 02270

SECTION 02300 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns, and plantings.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Subbase course for concrete walks and pavements.
5. Base course for asphalt paving.
6. Subsurface drainage backfill for walls and trenches.
7. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.

B. Related Sections include the following:

1. Division 2 Section "Site Clearing" for site stripping, grubbing, removing topsoil, and protecting trees to remain.
2. Division 2 Section "Dewatering" for lowering and disposing of ground water during construction.
3. Division 2 Section "Excavation Support and Protection."

1.3 UNIT PRICES

A. Provide unit price for rock excavation.

B. Rock Measurement: Volume of rock actually removed, measured in original position, but not to exceed the following:

1. 24 inches (600 mm) outside of concrete forms other than at footings.
2. 12 inches (300 mm) outside of concrete forms at footings.
3. 6 inches (150 mm) outside of minimum required dimensions of concrete cast against grade.
4. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
5. 6 inches (150 mm) beneath bottom of concrete slabs on grade.
6. 6 inches (150 mm) beneath pipe in trenches, and the greater of 24 inches (600 mm) wider than pipe or 42 inches (1065 mm) wide.

C. Unit prices for rock excavation include replacement with approved materials.

1.4 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Layer placed between the subbase course and asphalt paving.

C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations.

1. Additional Excavation: Excavation below subgrade elevations as directed by the Construction Manager. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Bulk Excavation: Excavations more than 10 feet (3 m) in width and pits more than 30 feet (9 m) in either length or width.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by the Construction Manager. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material exceeding 1 cu. yd. (0.76 cu. m) for bulk excavation or 3/4 cu. yd. (0.57 cu. m) for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- (1065-mm-) wide, short-tip-radius rock bucket; rated at not less than 120-hp (89-kW) flywheel power with bucket-curling force of not less than 25,000 lbf (111 kN) and stick-crowd force of not less than 18,700 lbf (83 kN); measured according to SAE J-1179.
2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp (157-kW) flywheel power and developing a minimum of 45,000-lbf (200-kN) breakout force; measured according to SAE J-732.

I. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material 3/4 cu. yd. (0.57 cu. m) or more in volume that when tested by an

independent geotechnical testing agency, according to ASTM D 1586, exceeds a standard penetration resistance of 100 blows/2 inches (97 blows/50 mm).

J. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

K. Subbase Course: Layer placed between the subgrade and base course for asphalt paving, or layer placed between the subgrade and a concrete pavement or walk.

L. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

M. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Each type of plastic warning tape.
2. Drainage fabric.
3. Separation fabric.

B. Samples: For the following:

1. 30-lb (14-kg) samples, sealed in airtight containers, of each proposed soil material from on-site or borrow sources.
2. 12-by-12-inch (300-by-300-mm) sample of drainage fabric.
3. 12-by-12-inch (300-by-300-mm) sample of separation fabric.

C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D 698 for each on-site or borrow soil material proposed for fill and backfill.
3. Laboratory compaction curve according to ASTM D 1557 for each on-site or borrow soil material proposed for fill and backfill.

D. Blasting plan approved by authorities having jurisdiction, for record purposes.

E. Seismic survey agency report, for record purposes.

1.6 QUALITY ASSURANCE

A. Comply with applicable requirements of NFPA 495, "Explosive Materials Code."

B. Seismic Survey Agency: An independent testing agency, acceptable to authorities having jurisdiction, experienced in seismic surveys and blasting procedures to perform the following services:

1. Report types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
2. Seismographic monitoring services during blasting operations.

C. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

D. Preexcavation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.7 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.
3. Contact utility-locator service for area where Project is located before excavating.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Backfill and Fill: Satisfactory soil materials.

E. Subbase: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2- inch (38-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

F. Base: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (38-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

G. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (38-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

H. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

I. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2- inch (38-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

J. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored as follows:

B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

C. Drainage Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:

1. Grab Tensile Strength: 110 lbf (490 N); ASTM D 4632.
2. Tear Strength: 40 lbf (178 N); ASTM D 4533.

3. Puncture Resistance: 50 lbf (222 N); ASTM D 4833.
4. Water Flow Rate: 150 gpm per sq. ft. (100 L/s per sq. m); ASTM D 4491.
5. Apparent Opening Size: No. 50 (0.3 mm); ASTM D 4751.

D. Separation Fabric: Woven geotextile, specifically manufactured for use as a separation geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:

1. Grab Tensile Strength: 200 lbf (890 N); ASTM D 4632.
2. Tear Strength: 75 lbf (333 N); ASTM D 4533.
3. Puncture Resistance: 90 lbf (400 N); ASTM D 4833.
4. Water Flow Rate: 4 gpm per sq. ft. (2.7 L/s per sq. m); ASTM D 4491.
5. Apparent Opening Size: No. 30 (0.6 mm); ASTM D 4751.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prior to any earthwork operation contractor shall consult Archaeologist. If any conflict between this section and the Archaeologist's decision arises the Archaeologist's decision shall prevail.

B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

C. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

D. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

B. Explosives: Obtain written permission from authorities having jurisdiction before bringing explosives to Project site or using explosives on Project site.

1. Do not damage adjacent structures, property, or site improvements or weaken the bearing capacity of rock subgrade when using explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

B. Classified Excavation: Excavation to subgrade elevations classified as earth and rock. Rock excavation will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.

a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.

2. Rock excavation includes removal and disposal of rock.

a. Do not excavate rock until it has been classified and cross-sectioned by the Construction Manager.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Pile Foundations: Stop excavations from 6 to 12 inches (150 to 300 mm) above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended for bearing surface.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit, unless otherwise indicated.

1. Clearance: 12 inches (300 mm) on each side of pipe or conduit.
2. Clearance: As indicated.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. For pipes and conduit less than 6 inches (150 mm) in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
2. For pipes and conduit 6 inches (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
3. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trench Bottoms: Excavate trenches 4 inches (100 mm) deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.

1. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.8 APPROVAL OF SUBGRADE

A. Notify Architect when excavations have reached required subgrade.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

C. Proof roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Architect or Engineer.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Architect.

1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for record documents.
3. Inspecting and testing underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.12 UTILITY TRENCH BACKFILL

A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings; fill with concrete to elevation of bottom of footings.

C. Provide 4-inch- (100-mm-) thick, concrete-base slab support for piping or conduit less than 30 inches (750 mm) below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches (100 mm) of concrete before backfilling or placing roadway subbase.

D. Place and compact initial backfill of subbase material, free of particles larger than 1 inch (25 mm), to a height of 12 inches (300 mm) over the utility pipe or conduit.

1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.

E. Coordinate backfilling with utilities testing.

F. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.

G. Place and compact final backfill of satisfactory soil material to final subgrade.

H. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.13 FILL

A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.

B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

C. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill.

3.14 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF BACKFILLS AND FILLS

A. Place backfill and fill materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:

D. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill material at 92 percent.
3. Under lawn or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill material at 85 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 1 inch (25 mm).
2. Walks: Plus or minus 1 inch (25 mm).
3. Pavements: Plus or minus 1/2 inch (13 mm).

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

3.17 SUBSURFACE DRAINAGE

A. Drainage Piping: As shown on contract drawings.

B. Subsurface Drain: Place a layer of drainage fabric around perimeter of drainage trench as indicated. Place a 6-inch (150-mm) course of filter material on drainage fabric to support

drainage pipe. Encase drainage pipe in a minimum of 12 inches (300 mm) of filter material and wrap in drainage fabric, overlapping sides and ends at least 6 inches (150 mm).

1. Compact each course of filter material to 95 percent of maximum dry unit weight according to ASTM D 698.

C. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches (300 mm) of final subgrade. Overlay drainage backfill with one layer of drainage fabric, overlapping sides and ends at least 6 inches (150 mm).

1. Compact each course of filter material to 95 percent of maximum dry density according to ASTM D 698.
2. Place and compact impervious fill material over drainage backfill to final subgrade.

3.18 SUBBASE AND BASE COURSES

A. Install separation fabric on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.

B. Under pavements and walks, place subbase course on separation fabric according to fabric manufacturer's written instructions and as follows:

C. Under pavements and walks, place subbase course on prepared subgrade and as follows:

1. Place base course material over subbase.
2. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
3. Shape subbase and base to required crown elevations and cross-slope grades.
4. When thickness of compacted subbase or base course is 6 inches (150 mm) or less, place materials in a single layer.
5. When thickness of compacted subbase or base course exceeds 6 inches (150 mm), place materials in equal layers, with no layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick when compacted.

D. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.19 DRAINAGE COURSE

A. Under slabs-on-grade, install drainage fabric on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends. Place drainage course on drainage fabric and as follows:

B. Under slabs-on-grade, place drainage course on prepared subgrade and as follows:

1. Compact drainage course to required cross sections and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.
2. When compacted thickness of drainage course is 6 inches (150 mm) or less, place materials in a single layer.
3. When compacted thickness of drainage course exceeds 6 inches (150 mm), place materials in equal layers, with no layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick when compacted.

3.20 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than three tests.
2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100 feet (30 m) or less of wall length, but no fewer than two tests.
3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150 feet (46 m) or less of trench length, but no fewer than two tests.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.21 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by the Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

2.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

B. Disposal: Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by the Construction Manager.

1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 02300

SECTION 02630 - STORM DRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes gravity-flow, nonpressure storm drainage outside the building, with the following components:

1. Special fittings for expansion and deflection.
2. Cleanouts.
3. Corrosion-protection piping encasement.
4. Precast concrete, Cast-in-place concrete manholes.
5. Catch basins

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. EPDM: Ethylene-propylene-diene-monomer rubber.

C. FRP: Fiberglass-reinforced plastic.

D. LLDPE: Linear low-density, polyethylene plastic.

E. HDPE: High Density Polyethylene plastic.

F. PP: Polypropylene plastic.

G. PVC: Polyvinyl chloride plastic.

1.4 PERFORMANCE REQUIREMENTS

A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water (30 kPa) Pipe joints shall be at least silttight, unless otherwise indicated.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Storage and leaching chambers.
2. Water quality treatment unit (CDS).
3. Drainage pipes

B. Shop Drawings: For the following:
1. Manholes: Include plans, elevations, sections, details, and frames and covers. Stormwater Inlets. Include plans, elevations, sections, details, and frames, covers, and grates.
2. Stormwater Detention Structures: Include plans, elevations, sections, details, frames and covers, design calculations, and concrete design-mix report.
3. Catch Basins.

C. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.

D. Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 50 feet (1:500) and vertical scale of not less than 1 inch equals 5 feet (1:50). Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.

E. Field quality-control test reports.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle manholes according to manufacturer's written rigging instructions.

D. Handle stormwater inlets according to manufacturer's written rigging instructions.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Construction Manager no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PE PIPE AND FITTINGS

A. Corrugated PE Drainage Pipe and Fittings NPS 10 (DN 250) and Smaller: AASHTO M 252M, Type S, with smooth waterway for coupling joints.

1. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings.
2. Soiltight Couplings: AASHTO M 252M, corrugated, matching tube and fittings.
3. Corrugated PE Pipe and Fittings NPS 12 to NPS 48 (DN 250 to DN 1200): AASHTO M 294M, Type S, with smooth waterway for coupling joints.
4. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.
5. Soiltight Couplings: AASHTO M 294M, corrugated, matching pipe and fittings.

B. Corrugated PE Pipe and Fittings NPS 56 and NPS 60 (DN 1400 and DN 1524): AASHTO MP7, Type S, with smooth waterway for coupling joints.

1. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.
2. Soiltight Couplings: AASHTO MP7, corrugated, matching pipe and fittings.

2.3 PVC PIPE AND FITTINGS

A. PVC Profile Gravity Sewer Pipe and Fittings: ASTM F 794 pipe, with bell-and-spigot ends; ASTM D 3034 fittings, with bell ends; and ASTM F 477, elastomeric seals.

2.4 CONCRETE PIPE AND FITTINGS

A. Nonreinforced-Concrete Sewer Pipe and Fittings: ASTM C 14 (ASTM C 14M), Class 4 with bell-and-spigot ends and gasketed joints with ASTM C 443 (ASTM C 443M), rubber gaskets.

B. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76 (ASTM C 76M), with bell-and-spigot ends and gasketed joints with ASTM C 443 (ASTM C 443M), rubber gaskets.

1. Class IV, Wall B.

2.5 CLEANOUTS

A. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

1. Available Manufacturers:

   a. Canplas Inc.
   b. IPS Corporation.
   c. NDS Inc.
   d. Plastic Oddities, Inc.
   e. Sioux Chief Manufacturing Company, Inc.
   f. Zurn Industries, Inc.; Zurn Light Commercial Specialty Plumbing Products.
   g. Others

2.6 MANHOLES

A. Standard Precast Concrete Manholes: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints.

1. Diameter: 48 inches (1200 mm) minimum, unless otherwise indicated.
2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
3. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (102-mm) minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
4. Riser Sections: 4-inch (102-mm) minimum thickness, and lengths to provide depth indicated.
5. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
6. Joint Sealant: ASTM C 990 (ASTM C 990M), bitumen or butyl rubber.
7. Resilient Pipe Connectors: ASTM C 923 (ASTM C 923M), cast or fitted into manhole walls, for each pipe connection.
8. Steps: Individual FRP steps or FRP ladder ASTM A 615/A 615M, deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D 4101, PP wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 48 inches 1.200 mm.
9. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, to match diameter of manhole frame and cover.
10. Protective Coating: Plant-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint 10-mil (0.26-mm) minimum thickness applied to exterior surfaces.
11. Manhole Frames and Covers: Manufactured by Campbell Foundry, Pattern no. 1202B.

    a. Material: ASTM A 536, Grade 60-40-18 ductile iron, unless otherwise indicated.

b. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil (0.26-mm) minimum thickness applied to all surfaces, unless otherwise indicated.

B. Designed Precast Concrete Manholes: ASTM C 913; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for sealant joints.

1. Ballast: Increase thickness of one or more precast concrete sections or add concrete to manhole, as required to prevent flotation.
2. Joint Sealant: ASTM C 990 (ASTM C 990M), bitumen or butyl rubber.
3. Resilient Pipe Connectors: ASTM C 923 (ASTM C 923M), cast or fitted into manhole walls, for each pipe connection.
4. Steps: Individual FRP steps or FRP ladder ASTM A 615/A 615M, deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 48 inches (1,200 mm).
5. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, to match diameter of manhole frame and cover.
6. Protective Coating: Plant-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil (0.26-mm) minimum thickness applied to exterior surfaces.
7. Manhole Frames and Covers: Manufactured by Campbell Foundry, Pattern no. 12028.

   a. Material: ASTM A 536, Grade 60-40-18 ductile iron, unless otherwise indicated.
   b. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil (0.26-mm) minimum thickness applied to all surfaces, unless otherwise indicated.

C. Cast-in-Place Concrete Manholes: Construct of reinforced-concrete bottom, walls, and top; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.

1. Ballast: Increase thickness of concrete, as required to prevent flotation.
2. Resilient Pipe Connectors: ASTM C 923 (ASTM C 923M), cast or fitted into manhole walls, for each pipe connection.
3. Steps: Individual FRP steps or FRP ladder ASTM A 615/A 615M, deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 48 inches (1,200 mm).
4. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, to match diameter of manhole frame and cover.
5. Manhole Frames and Covers: Ferrous; 24-inch (610-mm) ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch- (102-mm-) minimum width flange and 26-inch- (660-mm-) diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."

a. Material: ASTM A 536, Grade 60-40-18 ductile iron, unless otherwise indicated.
b. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil (0.26-mm) minimum thickness applied to all surfaces, unless otherwise indicated.

2.7 CONCRETE

A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi (27.6 MPa) minimum, with 0.45 maximum water-cementitious materials ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (420 MPa), deformed steel.

C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi (20.7 MPa) minimum, with 0.58 maximum water-cementitious materials ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (420 MPa), deformed steel.

2.8 CATCH BASINS

A. Standard Precast Concrete Catch Basins: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints.

1. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (102-mm) minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
2. Riser Sections: 4-inch (102-mm) minimum thickness, 48-inch (1220-mm) diameter, and lengths to provide depth indicated.
3. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
4. Joint Sealant: ASTM C 990 (ASTM C 990M), bitumen or butyl rubber.
5. Grade Rings: Include 2 or 3 reinforced-concrete rings, of 6- to 9-inch (150- to 229-mm) total thickness, that match 24-inch- (610-mm-) diameter frame and grate.
6. Steps: Individual FRP steps or FRP ladder ASTM A 615/A 615M, deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 36 inches (900 mm).

7. Pipe Connectors: ASTM C 923 (ASTM C 923M), resilient, of size required, for each pipe connecting to base section.

B. Designed Precast Concrete Catch Basins: ASTM C 913, precast, reinforced concrete; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for sealant joints.

1. Joint Sealants: ASTM C 990 (ASTM C 990M), bitumen or butyl rubber.
2. Grade Rings: Include 2 or 3 reinforced-concrete rings, of 6- to 9-inch (150- to 229-mm) total thickness, that match 24-inch- (610-mm-) diameter frame and grate.
3. Steps: Individual FRP steps or FRP ladder ASTM A 615/A 615M, deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 36 inches (900 mm).
4. Pipe Connectors: ASTM C 923 (ASTM C 923M), resilient, of size required, for each pipe connecting to base section.

C. Cast-in-Place Concrete, Catch Basins: Construct of reinforced concrete; designed according to ASTM C 890 for structural loading; of depth, shape, dimensions, and appurtenances indicated.

1. Bottom, Walls, and Top: Reinforced concrete.
2. Channels and Benches: Concrete.
3. Steps: Individual FRP steps or FRP ladder ASTM A 615/A 615M, deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 36 inches (900 mm).

D. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include flat grate with small square or short-slotted drainage openings.

1. Size: 24 by 24 inches (610 by 610 mm) minimum, unless otherwise indicated.
2. Grate Free Area: Approximately 50 percent, unless otherwise indicated.

E. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include 24-inch (610-mm) ID by 7- to 9-inch (178- to 229-mm) riser with 4-inch (102-mm) minimum width flange, and 26-inch- (660-mm-) diameter flat grate with small square or short-slotted drainage openings.

1. Grate Free Area: Approximately 50 percent, unless otherwise indicated.

2.9 STORMWATER INLETS

A. Gutter Inlets: Made with horizontal gutter opening, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.

B. Frames and Grates: Heavy-duty frames and grates according to utility standards.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Division 2 Section "Earthwork."

3.2 PIPING APPLICATIONS

A. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.

   a. Unshielded flexible or rigid couplings for same or minor difference OD pipes.
   b. Unshielded, increaser/reducer-pattern, flexible or rigid couplings for pipes with different OD.
   c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

B. Special Pipe Fittings: Use for pipe expansion and deflection. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

C. Gravity-Flow, Nonpressure Sewer Piping: Use any of the following pipe materials for each size range:

1. NPS 4 and NPS 6 (DN 100 and DN 150): Corrugated PE drainage pipe and fittings, silttight couplings, and coupled joints.
2. NPS 4 and NPS 6 (DN 100 and DN 150): PVC sewer pipe and fittings, gaskets, and gasketed joints.
3. NPS 8 to NPS 12 (DN 200 to DN 300): Corrugated PE drainage pipe and fittings in NPS 8 and NPS 10 (DN 200 and DN 250) and corrugated PE pipe and fittings in NPS 12 (DN 300), silttight couplings, and coupled joints.
4. NPS 8 to NPS 12 (DN 200 to DN 300): PVC sewer pipe and fittings, gaskets, and gasketed joints.

5. NPS 8 to NPS 12 (DN 200 to DN 300): PVC profile gravity sewer pipe and fittings, gaskets, and gasketed joints.
6. NPS 8 to NPS 12 (DN 200 to DN 300): Nonreinforced-concrete sewer pipe and fittings, gaskets, and gasketed joints.
7. NPS 8 to NPS 12 (DN 200 to DN 300): NPS 12 (DN 300) reinforced-concrete sewer pipe and fittings, gaskets, and gasketed joints.

8. NPS 18 to NPS 36 (DN 450 to DN 900): Corrugated PE pipe and fittings, soiltight couplings, and coupled joints.
9. NPS 18 to NPS 36 (DN 450 to DN 900): PVC sewer pipe and fittings, gaskets, and gasketed joints.
10. NPS 18 to NPS 36 (DN 450 to DN 900): PVC profile gravity sewer pipe and fittings, gaskets, and gasketed joints.

3.3 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.

F. Install gravity-flow, nonpressure drainage piping according to the following:

1. Install piping pitched down in direction of flow, at minimum slope of 0.5 percent, unless otherwise indicated.
2. Install piping NPS 6 (DN 150) and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
3. Install piping with 12-inch (305 mm) minimum cover.
4. Install piping below frost line.
5. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."

.

6. Install PE corrugated sewer piping according to CPPA's "Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings."

3.4 PIPE JOINT CONSTRUCTION

A. Basic pipe joint construction is specified in Division 2 Section "Piped Utilities - Basic Materials and Methods." Where specific joint construction is not indicated, follow piping manufacturer's written instructions.

B. Join gravity-flow, nonpressure drainage piping according to the following:

1. Join corrugated PE piping according to CPPA 100 and the following:

   a. Use silttight couplings for Type 1, silttight joints.
   b. Use soiltight couplings for Type 2, soiltight joints.

2. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric gasket joints.
3. Join PVC profile gravity sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints..

3.5 CLEANOUT INSTALLATION

A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

1. Use light-duty, top-loading classification cleanouts in earth or unpaved foot-traffic and lawn areas.
2. Use medium-duty, top-loading classification cleanouts in paved foot-traffic areas.
3. Use heavy-duty, top-loading classification cleanouts in vehicle-traffic service areas.
4. Use extra-heavy-duty, top-loading classification cleanouts in roads areas.

B. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.6 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.

B. Install precast concrete manhole sections according to ASTM C 891.

C. Construct cast-in-place manholes as indicated.

D. Install PE sheeting on earth where cast-in-place-concrete manholes are to be built.

E. Install FRP manholes according to manufacturer's written instructions.

F. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 1 inch (25 mm) above finished surface elsewhere, unless otherwise indicated.

3.7 CATCH BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.

B. Set frames and grates to elevations indicated.

3.8 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318/318R.

3.9 CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Division 15 Section "Storm Drainage Piping."

B. Connect force-main pressure piping to building's storm drainage force mains specified in Division 15 Section "Storm Drainage Piping." Terminate piping where indicated.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch (150-mm) overlap, with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).
2. Make branch connections from side into existing piping, NPS 4 to NPS 20 (DN 100 to DN 500). Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).
3. Make branch connections from side into existing piping, NPS 21 (DN 525) or larger, or to underground manholes and structures by cutting opening into existing unit large enough to allow 3 inches (76 mm) of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall, unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches (150 mm) of concrete for minimum length of 12 inches (300 mm) to provide additional support of collar from connection to undisturbed ground.

    a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi (20.7 MPa), unless otherwise indicated.
    b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

C. Connect to sediment interceptors specified in Division 2 Section "Interceptors."

3.10 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:

1. Close open ends of piping with at least 12-inch- (304-mm-) thick, brick masonry bulkheads.
2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

B. Abandoned Manholes and Structures: Excavate around manholes and structures as required and use one procedure below:

1. Remove manhole or structure and close open ends of remaining piping.
2. Remove top of manhole or structure down to at least 36 inches (915 mm) below final grade. Fill to within 12 inches (300 mm) of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.

C. Backfill to grade according to Division 2 Section "Earthwork."

3.11 PAINTING

A. Clean and prepare concrete manhole surfaces for field painting. Remove loose efflorescence, chalk, dust, grease, oils, and release agents. Roughen surface as required to remove glaze. Paint the following concrete surfaces as recommended by paint manufacturer:

1. Cast-in-Place-Concrete Manholes: All exterior, except bottom.
2. Precast Concrete Manholes: All exterior.

B. Prepare ferrous frame and cover surfaces according to SSPC-PA 1 and paint according to SSPC-PA 1 and SSPC-Paint 16. Do not paint surfaces with foundry-applied, corrosion-resistant coating.

3.12 IDENTIFICATION

A. Materials and their installation are specified in division 2 Section "Earthwork." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

1. Use detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.13 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (610 mm) of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:

    a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    c. Crushed, broken, cracked, or otherwise damaged piping.
    d. Infiltration: Water leakage into piping.
    e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:

    a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
    b. Option: Test plastic piping according to ASTM F 1417.
    c. Option: Test concrete piping according to ASTM C 924 (ASTM C 924M).

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.14 CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

END OF SECTION 02630

SECTION 02741 - HOT-MIX ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Hot-mix asphalt paving.
2. Hot-mix asphalt patching.
3. Hot-mix asphalt paving overlay.
4. Asphalt surface treatments.
5. Pavement-marking paint.

B. Related Sections include the following:

1. Division 2 Section "Earthwork" for aggregate subbase and base courses and for aggregate pavement shoulders.

1.3 DEFINITIONS

A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

B. DOT: Department of Transportation.

1.4 SYSTEM DESCRIPTION

A. Provide hot-mix asphalt paving according to materials, workmanship, and other applicable requirements of standard specifications of state or local DOT.

1. Standard Specification: NJDOT Standard Specifications for Road and Bridge Construction, 2001 and as amended.
2. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

B. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.

C. Job-Mix Designs: For each job mix proposed for the Work.

D. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international graphics symbol, spaces dedicated to people with disabilities.

E. Samples: For each paving fabric, 12 by 12 inches (300 by 300 mm) minimum.

F. Qualification Data: For manufacturer.

G. Material Test Reports: For each paving material.

H. Material Certificates: For each paving material, signed by manufacturers.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer.

1. Manufacturer shall be a paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of the state in which Project is located.

B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated, as documented according to ASTM E 548.

C. Regulatory Requirements: Comply with NJ Standard Specifications for Road and Bridge Construction, 2001 and as amended for asphalt paving work.

D. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:

1. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
2. Review condition of subgrade and preparatory work.
3. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:

1. Prime and Tack Coats: Minimum surface temperature of 60 deg F (15.5 deg C).
2. Slurry Coat: Comply with weather limitations of ASTM D 3910.
3. Asphalt Base Course: Minimum surface temperature of 40 deg F (4 deg C) and rising at time of placement.
4. Asphalt Surface Course: Minimum surface temperature of 60 deg F (15.5 deg C) at time of placement.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F (4 deg C) for oil-based materials, 50 deg F (10 deg C) for water-based materials, and not exceeding 95 deg F (35 deg C).

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel, or properly cured, crushed blast-furnace slag.

C. Fine Aggregate: AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, properly cured blast-furnace slag, or combinations thereof.

1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.

D. Mineral Filler: AASHTO M 17, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO MP 1, PG 64-22.

B. Asphalt Cement: ASTM D 3381 for viscosity-graded material.

C. Prime Coat: ASTM D 2027, medium-curing cutback asphalt, MC-30 or MC-70.

D. Prime Coat: Asphalt emulsion prime complying with New Jersey DOT requirements.

E. Tack Coat: AASHTO M 140, emulsified asphalt or AASHTO M 208, cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

F. Fog Seal: AASHTO M 140, emulsified asphalt or AASHTO M 208, cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application.

G. Water: Potable.

H. Undersealing Asphalt: AASHTO M 238, pumping consistency.

2.3 AUXILIARY MATERIALS

A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.

B. Sand: AASHTO M 29, Grade Nos. 2 or 3.

C. Paving Geotextile: AASHTO M 288, nonwoven polypropylene; resistant to chemical attack, rot, and mildew; and specifically designed for paving applications.

D. Joint Sealant: AASHTO M 301, hot-applied, single-component, polymer-modified bituminous sealant.

E. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with FS TT-P-115, Type I or AASHTO M 248, Type N.

1. Color: White and Blue.

2.4 MIXES

A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
2. Base Course: Mix I-2.
3. Surface Course: Mix I-5.

B. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types."

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

2. Provide mixes complying with composition, grading, and tolerance requirements in ASTM D 3515 for the following nominal, maximum aggregate sizes:

   a. Base Course: 4 inch.
   b. Surface Course: 2 inch.

C. Emulsified-Asphalt Slurry: ASTM D 3910, Type 1, consisting of emulsified asphalt, fine aggregate, and mineral fillers.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.

B. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.

C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 PATCHING

A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseat concrete pieces firmly.

   1. Pump hot undersealing asphalt under rocking slabs until slab is stabilized or, if necessary, crack slab into pieces and roll to reseat pieces firmly.
   2. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.

C. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).

   1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
   2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

D. Patching: Fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact flush with adjacent surface.

E. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.3 REPAIRS

A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch (25 mm) in existing pavements.

1. Install leveling wedges in compacted lifts not exceeding 3 inches (75 mm) thick.

B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4 inch (6 mm).

1. Clean cracks and joints in existing hot-mix asphalt pavement.
2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.
3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.

3.4 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.

C. Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.15 to 0.50 gal./sq. yd. (0.7 to 2.3 L/sq. m). Apply enough material to penetrate and seal but not flood surface. Allow prime coat to cure for 72 hours minimum.

1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
2. Protect primed substrate from damage until ready to receive paving.

D. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.

2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.5 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
2. Place hot-mix asphalt surface course in single lift.
3. Spread mix at minimum temperature of 250 deg F (121 deg C).
4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.6 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150 mm).
3. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm).
4. Construct transverse joints as described in AI MS-22, "Construction of Hot Mix Asphalt Pavements."
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.7 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 96 percent of reference laboratory density according to AASHTO T 245, but not less than 94 percent nor greater than 100 percent.
2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch (13 mm).
2. Surface Course: Plus 1/4 inch (6 mm), no minus.

B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch (6 mm).
2. Surface Course: 1/8 inch (3 mm).

3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm).

3.9 SURFACE TREATMENTS

A. Fog Seals: Apply fog seal at a rate of 0.10 to 0.15 gal./sq. yd. (0.45 to 0.7 L/sq. m) to existing asphalt pavement and allow to cure. With a fine sand, lightly dust areas receiving excess fog seal.

B. Slurry Seals: Apply slurry coat in a uniform thickness according to ASTM D 3910 and allow to cure.

1. Roll slurry seal to remove ridges and provide a uniform, smooth surface.

3.10 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for 30 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm).

1. Broadcast glass spheres uniformly into wet pavement markings at a rate of 6 lb/gal. (0.72 kg/L).

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.

B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to AASHTO T 168.

1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.

   a. One core sample will be taken for every 1000 sq. yd. (836 sq. m) or less of installed pavement, with no fewer than 3 cores taken.
   b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.

F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.12 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow excavated materials to accumulate on-site.

END OF SECTION 02741

SECTION 02764 - PAVEMENT JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Expansion and contraction joints within portland cement concrete pavement.
2. Joints between portland cement concrete and asphalt pavement.

B. Related Sections include the following:

1. Division 2 Section "Hot-Mix Asphalt Paving" for constructing joints between concrete and asphalt pavement.
2. Division 7 Section "Joint Sealants" for sealing nontraffic and traffic joints in locations not specified in this Section.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Verification: For each type and color of joint sealant required. Install joint-sealant samples in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.

D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Compatibility and Adhesion Test Reports: From joint sealant manufacturer indicating the following:

1. Materials forming joint substrates and joint-sealant backer materials have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

F. Product Test Reports: From a qualified testing agency indicating joint sealants comply with requirements, based on comprehensive testing of current product formulations.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency, based on testing current sealant formulations within a 36-month period.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
2. Test joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

D. Preconstruction Compatibility and Adhesion Testing: Submit to joint sealant manufacturer, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

   a. Perform tests under environmental conditions replicating those that will exist during installation.

2. Submit not fewer than nine pieces of each type of material, including joint substrates, joint-sealant backer materials, secondary seals, and miscellaneous material.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
5. Testing will not be required if joint sealant manufacturer submits joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

1.5 DELIVERY, STORAGE, AND HANDLING

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

B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
2. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F (4.4 deg C).
3. When joint substrates are wet.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than that allowed by joint sealant manufacturer for application indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: Match Architect's samples.

2.2 COLD-APPLIED JOINT SEALANTS

A. Multicomponent Jet-Fuel-Resistant Sealant for Concrete: Pourable, chemically curing elastomeric formulation complying with the following requirements for formulation and with ASTM C 920 for type, grade, class, and uses indicated:

1. Urethane Formulation: Type M; Grade P; Class 12-1/2; Uses T, M, and, as applicable to joint substrates indicated, O.
2. Coal-Tar-Modified Polymer Formulation: Type M; Grade P; Class 25; Uses T and, as applicable to joint substrates indicated, O.
3. Bitumen-Modified Urethane Formulation: Type M; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.

B. Single-Component Jet-Fuel-Resistant Urethane Sealant for Concrete: Single-component, pourable, coal-tar-modified, urethane formulation complying with ASTM C 920 for Type S; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.

C. Type NS Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS.

D. Type SL Silicone Sealant for Concrete and Asphalt: Single-component, low-modulus, neutral-curing, self-leveling silicone sealant complying with ASTM D 5893 for Type SL.

E. Multicomponent Low-Modulus Sealant for Concrete and Asphalt: Proprietary formulation consisting of reactive petropolymer and activator components producing a pourable, self-leveling sealant.

F. Available Products: Subject to compliance with requirements, cold-applied joint sealants that may be incorporated into the Work include, but are not limited to, the following:

G. Products: Subject to compliance with requirements, provide one of the following:

1. Multicomponent Jet-Fuel-Resistant Sealant for Concrete:

   a. Vulkem 202; Mameco International.
   b. SEALTIGHT GARDOX; W.R. Meadows, Inc.
   c. Urexpan NR-300; Pecora Corporation.
   d. Sonomeric 2; Sonneborn Building Products Div., ChemRex, Inc.

2. Single-Component Jet-Fuel-Resistant Urethane Sealant for Concrete:

   a. Vulkem 200; Mameco International.
   b. Sonomeric 1; Sonneborn Building Products Div., ChemRex, Inc.

3. Type NS Silicone Sealant for Concrete:

   a. Roadsaver Silicone-SL; Crafco Inc.
   b. 888; Dow Corning.

4. Type SL Silicone Sealant for Concrete and Asphalt:

   a. 890-SL; Dow Corning.

5. Multicomponent Low-Modulus Sealant for Concrete and Asphalt:

   a. SOF-SEAL; W.R. Meadows, Inc.

2.3 HOT-APPLIED JOINT SEALANTS

A. Jet-Fuel-Resistant Elastomeric Sealant for Concrete: Single-component formulation complying with ASTM D 3569.

B. Jet-Fuel-Resistant Sealant for Concrete and Tar Concrete: Single-component formulation complying with ASTM D 3581.

C. Elastomeric Sealant for Concrete: Single-component formulation complying with ASTM D 3406.

D. Sealant for Concrete and Asphalt: Single-component formulation complying with ASTM D 3405.

E. Available Products: Subject to compliance with requirements, hot-applied joint sealants that may be incorporated into the Work include, but are not limited to, the following:

F. Products: Subject to compliance with requirements, provide one of the following:

1. Jet-Fuel-Resistant Elastomeric Sealant for Concrete:

   a. Superseal 444/777; Crafco, Inc.
   b. POLY-JET 3569; W.R. Meadows, Inc.

2. Jet-Fuel-Resistant Sealant for Concrete and Tar Concrete:

   a. SUPERSEAL 1614A; Crafco Inc.
   b. POLY-JET 1614; W.R. Meadows, Inc.
   c. POLY-JET 3406; W.R. Meadows, Inc.
   d. POLY-JET 3569, W.R. Meadows, Inc.

3. Elastomeric Sealant for Concrete:

   a. Superseal 444/777; Crafco, Inc.
   b. POLY-JET 3406; W.R. Meadows, Inc.

4. Sealant for Concrete and Asphalt:

   a. ROADSAVER 221; Crafco Inc.
   b. Product #9005; Koch Materials Company.
   c. Product #9030; Koch Materials Company.
   d. SEALTIGHT HI-SPEC; W.R. Meadows, Inc.

2.4 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint sealant manufacturer based on field experience and laboratory testing.

B. Round Backer Rod for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depths and prevent bottom-side adhesion of sealant.

C. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depths, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

D. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depths and prevent bottom-side adhesion of sealant.

2.5 PRIMERS

A. Primers: Product recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint- sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's written installation instructions applicable to products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of backer materials.
2. Do not stretch, twist, puncture, or tear backer materials.
3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

D. Install sealants by proven techniques to comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses provided for each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents that are approved in writing by joint sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint sealant manufacturer's written instructions, unless otherwise indicated.

G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

3.4 CLEANING

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

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

END OF SECTION 02764

SECTION 02768 - DECORATIVE CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes colored concrete sidewalk and colored stamped concrete sidewalk paving.

1. Colored Stamped Concrete Sidewalk: The sidewalk shall be a colored stamped concrete with a bluestone pattern. The sidewalk shall also include a “Yorkstone” random pattern. Integral colored treatment shall be French gray C-14 (special order) with antique release, color Deep Charcoal A-21.

B. Related Sections:

1. Division 1 Sections
2. Division 2 Sections

1.3 DEFINITIONS

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

1.4 SUBMITTALS

A. Product Data: For each type of product indicated

B. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color, pattern, or texture selection.

C. Samples for Verification: For each type of exposed color, pattern, or texture indicated.

D. Other Action Submittals:

1. Design Mixtures: For each decorative concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

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

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

1. Cementitious materials
2. Steel reinforcement and reinforcement accessories
3. Admixtures
4. Curing compounds
5. Bonding agent or epoxy adhesive
6. Expansion Joint
7. Joint fillers, and caulking

G. Material Test Reports: For each of the following:

1. Aggregates. Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

H. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer of decorative concrete paving systems.

B. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual – Section 3, "Plant Certification Checklist").

C. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

D. Source Limitations: Obtain decorative concrete paving products and each type or class of cementitious material of the same brand from same manufacturer's plant, and obtain each aggregate from single source.

E. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.

F. ACI Publications: Comply with ACI 301 unless otherwise indicated.

G. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups of full-thickness sections of decorative concrete paving to demonstrate typical joints; surface color, pattern, and texture; curing; and standard or workmanship.
2. Build mockups of decorative concrete paving in the location and of the size indicated or, if not indicated, build mockups where directed by Architect and not less than 96 inches (2400 mm) by existing width of sidewalk.
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. Approval mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

H. Pre-installation Conference: Conduct conference at Project site.

1. Review methods and procedures related to decorative concrete paving, including but not limited to, the following:

   a. Concrete mixture design
   b. Quality control of concrete materials and decorative concrete paving construction practices.

2. Require representatives of each entity directly concerned with decorative concrete paving to attend, including the following:

   a. Contractor’s superintendent.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Ready-mix concrete manufacturer.
   d. Decorative concrete paving Installer.
   e. Manufacturer’s representative of decorative concrete paving system.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

1. Use flexible or uniformly curved forms for curves of a radius of 100 feet (30.5 m) or less. Do not use notched and bent forms.

B. Form-Release Agent: Commercially formulated for-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel wire into flat sheets.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening, welded wire reinforcement in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

1. Equip wire bar supports and sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, gray Portland cement Type I/II. Supplement with the following:

   a. Fly Ash: ASTM C 618, Class C or F.
   b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, Class 4S uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Aggregate Size: ¾ inch (19 mm) nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: Potable and complying with ASTM C 94/C 94M.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A, colored.
2. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D, colored.
3. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.

F. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.

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

a. Bon Tool Co.
b. Brickform.
c. Davis Colors.
d. Scofield, L.M. Company. (Basis-of-Design Product)

2.4 SURFACE COLORING MATERIALS

A. Pigmented Mineral Dry-Shake Hardener: Factory-packaged, dry combination of Portland cement, graded quartz aggregate, color pigments, and plasticizing admixture. Use color pigments that are finely ground, nonfading mineral oxides interground with cement.

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

a. BASF Construction Chemicals, LLC; Mastercron.
b. Bon Tool Co.; True Color Hardener.
c. Brickform; Color Hardener
d. Scofield, L.M. Company; LITHOCHROME Color Hardener.

B. Pigmented Powder Release Agent: Factory-packaged, dry combination of surface-conditioning and dispersing agents interground with color pigments that facilitates release of stamp mats. Use color pigments that are finely ground, nonfading mineral oxides interground with cement.

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

a. Bon Tool Co.; True Color Release Agent
b. Brickform; Antique Release.
c. Scofield, L.M. Company; LITHOCHROME Antiquing Release.

2.5 STAMPING DEVICES

A. Stamp Mats: Semirigid polyurethane mats with projecting textured and ridged underside capable of imprinting texture and joint patterns on plastic concrete.

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

a. Bon Tool Co.
b. Brickform.
c. Scofield, L.M. Company.

2.6 CURING AND SEALING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

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

a. BASF Construction Chemicals, LLC; Confilm.
b. Bon Tool Co.; #32-301 Evaporation Retarder.
c. Brickform; Evaporation Retarder.
d. Sika Corporation, Inc.; SikaFilm.

B. Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type I, Class B, manufactured for colored concrete.

1. For integrally colored concrete, curing compound shall be pigmented type approved by coloring admixture manufacturer.
2. For concrete indicated to be sealed, curing compound shall be compatible with sealer.

C. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type I, Class A, manufactured for use with colored concrete.

D. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type I, Class A, manufactured for use with colored concrete.

E. Clear Acrylic Sealer: Manufacturer’s standard, waterborne, nonyellowing and UV-resistant, membrane-forming, medium-gloss, acryolic copolymer emulsion solution,

manufactured for colored concrete, containing not less than 15 percent solids by volume.

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

    a. Bomanite Corporation; Bomanite Hydrocoat.
    b. Brickform; Satin-Seal.
    c. Scofield, L.M. Company; CEMENTONE Clear Sealer.

2. Grit: Follow manufacturer's recommendations for proper mixing with sealer. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. SharkGrip; H&C Concrete Products.
    b. Dura-Grip; Proline Concrete Tools.
    c. Shur-Grip; Increte Systems.

2.7 RELATED MATERIALS

A. Expansion Joints: Shall be a 'snap-cap' joint or equal. Cap portion shall be lifted and remaining void filled with polyurethane Joint sealant. Submit product literature and color samples for final Owner selection.

B. Polyurethane Sealant: Sealant/Caulking shall match the adjacent pavement color. Expansion Joints for colored stamped concrete sidewalk shall be located at a distance of 12' minimum and 16' maximum apart, or as designated on the plans to compliment indicated pavement patterning. Submit product literature and color samples for final Owner selection.

2.8 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

    1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.

B. Proportion mixtures to provide normal-weight concrete with the following properties:
    1. Compressive Strength (28 Days): 4500 psi (31 MPa).
    2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
    3. Slump Limit: 3 inches (75 mm), plus or minus 1 inch (25 mm).

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content: 6 percent plus or minus 1.5 percent for ¾-inch (19-mm) nominal maximum aggregate size.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture, water-reducing and retarding admixture, or water-reducing and accelerating admixture in concrete as required for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

F. Cementitious Materials: Limit percentage by weight of cementitious materials other than Portland cement according to ACI 301 (ACI 301M) requirements for concrete exposed to deicing chemicals as follows:

1. Fly Ash or Pozzolan: 25 percent.
2. Ground Granulated Blast Furnace Slag: 50 percent.
3. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 25 percent.

G. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For concrete batches of 1 cu. Yd. (0.76 cu. M) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.

2. For concrete batches larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below decorative concrete paving to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph (5 km/h).
2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axel dump truck weighing not less than 15 tons (13.6 tonnes).
3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of ½ inch (13 mm) according to requirements in Division 2 Section “Earthwork.”

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

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

B. Protect adjacent construction from discoloration and spillage during application of color hardeners, release agents, stains, curing compounds, and sealers.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch (50-mm) overlap to adjacent mats.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
2. Butt Joints: Use epoxy bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate expansion joints at intervals shown on drawings, unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than ½ inch (13 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.

4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints; Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a ¼-inch (6 mm) radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a ¼-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate edging tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 (ACI 301M) requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. DO not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 (ACI 301M) by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement and joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing or low temperatures. Comply with ACI 306.1 and the following:
1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified an approved in design mixtures.

K. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to

power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

3.8 INTEGRALLY COLORED CONCRETE FINISH

A. Integrally Colored Concrete Finish: After final floating, apply the following finish:

1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristly broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.

3.9 PIGMENTED MINERAL DRY-SHAKE HARDENER

A. Pigmented Mineral Dry-Shake Hardener Finish: After initial floating, apply dry-shake materials to paving surfaces according to manufacturer's written instructions and as follows:

1. Uniformly apply dry-shake hardener at a rate of 100 lb/100 sq. ft. (49 kg/10 sq. m) unless greater amount is recommended by manufacturer to match paving color required.
2. Uniformly distribute approximately two-thirds of dry-shake hardener over the concrete surface with mechanical spreader; allow hardener to absorb moisture and embed it by power floating. Follow power floating with a second application of pigmented mineral dry-shake hardener, uniformly distributing remainder of material at right angles to first application to ensure uniform color, and embed hardener by final power floating.
3. After final power floating, apply the following finish:

    a. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.

B. Pigmented Powder Release Agent: Uniformly distribute onto dry-shake-hardened and still-plastic concrete at a rate of 3 to 4 lb/100 sq. ft. (1.5 to 2 kf/10 sq. m).

3.10 STAMPING

A. Mat Stamping: After floating and while concrete is plastic, apply mat-stamped finish.

1. Pigmented Powder Release Agent: Uniformly distribute onto concrete at a rate of 3 to 4 lb/100 sq. ft. (1.5 to 2 kg/10 sq. m).
2. After application of release agent, accurately align and place stamp mats in sequence.

3. Uniformly load mats and press into concrete to produce required imprint pattern and depth of imprint on concrete surface. Gently remove stamp mats. Hand stamp edges and surfaces unable to be imprinted by stamp mats.
4. Remove residual release agent according to manufacturer's written instructions, but no fewer than three days after stamping concrete. High-pressure-wash surface and joint patterns, taking care not to damage stamped concrete. Control, collect, and legally dispose of runoff.

B. Tool Stamping: After floating and while concrete is plastic, apply tool-stamped finish.

1. Cover surface with polyethylene film, stretch taut to remove wrinkles, lap sides and ends 3 inches (75 mm), and secure to edge forms. Lightly broom surface to remove air bubbles.
2. Accurately align and place stamp tools in sequence and stamp into concrete to produce required imprint pattern and depth of imprint on concrete surface. Gently remove stamp tools. Hand stamp edges and surfaces unable to be imprinted by stamp tools.
3. Carefully remove polyethylene film immediately after tool stamping.

C. Do not apply concrete stamping or stenciling when rain, snow, or excessive moisture is expected during application or within 24 hours after application.

3.11 CONCRETE PROTECTION AND CURING

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

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Compound: Apply curing compound immediately after final finishing. Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after application. Maintain continuity of coating, and repair damage during curing period.

1. Cure integrally colored concrete with a curing compound.
2. Cure concrete finished with pigmented mineral dry shaker hardener with a curing compound.

F. Curing and Sealing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial applications. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 SLIP-RESISTANT CLEAR ACRYLIC SEALER

A. Grit Additive: Follow manufacturer's recommendations for mixing with sealer.

B. Apply uniformly in two coats in continuous operations according to manufacturer's written instructions. Allow first coat to dry before applying second coat, at 90 degrees to the direction of the first coat using same application methods and rates.

1. Begin sealing dry surface no sooner than 14 days after concrete placement.

3.13 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: ¼ inch (6 mm).
2. Thickness: Plus 3/8 inch (10 mm), minus ¼ inch (6 mm).
3. Surface: Gap below 10-foot- (3-m-) long, unleveled straightedge not to exceed ¼ inch (6 mm)
4. Joint spacing: 3 inches (75 mm).
5. Contraction Joint Depth: Plus ¼ inch (6 mm), no minus.
6. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.14 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 5000 sq. ft. (465 sq. m) or fraction thereof of each concrete mixture placed each day.

a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when it is 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.

    a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

D. Test results shall be reported in writing to Architect, concrete manufacturer and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

G. Decorative concrete paving will be considered defective if it does not pass tests and inspections.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Prepare test and inspection reports.

3.15 REPAIRS AND PROTECTION

A. Remove and replace decorative concrete paving that is broken or damaged or does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Detailing: Grind concrete "squeeze" left from tool placement. Color ground areas with slurry of color hardener mixed with water and bonding agent. Remove excess release agent with high-velocity blower.

C. Protect decorative concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain decorative concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

3.16 DECORATIVE CONCRETE PAVING SCHEDULE

A. Patterned Decorative Concrete Paving:

1. The sidewalk, located at the south side of the project site, shall be a colored stamped concrete with a bluestone pattern. The sidewalk shall also include a "Yorkstone" random pattern. Integral colored treatment shall be French gray C-14 (special order) with antique release, color Deep Charcoal A-21.

2. Coloring Method: Integrally colored and pigmented mineral dry-shake hardener.

    a. Color: As selected indicated above and final color submittals by Owner. Mockups must be constructed as required in the specifications.

3. Field Patterning Method: Stamped

    a. Texture and Pattern: As shown on drawings.
    b. Pigmented Mineral Dry-Shake Hardener: As shown on drawings.
    c. Release Agent: Match pigmented mineral dry-shake hardener.

4. Border and Accent Strip Patterning Method: Stamped and smooth trowel finished as indicated on drawings.

    a. Texture and Pattern: As shown on drawings.
    b. Pigmented Mineral Dry-Shake Hardener: As shown on drawings.
    c. Release Agent: Match pigmented mineral dry-shake hardener.

END OF SECTION 02768

SECTION 02780 – UNIT PAVING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. Furnish all labor, materials and machinery for the placement of unit pavers as shown on the drawings in the manner specified herein.

1.2 RELATED WORK OF OTHER SECTIONS

A. Earthwork Section 02200

1.3 REFERENCES

A. ASTM C936 Specification for Solid Interlocking Concrete Paving Units.

B. ASTM C140 Method of Sampling and Testing Concrete Masonry Units.

C. ASTM C136 Method for Sieve Analysis for Fine and Coarse Aggregate.

D. ASTM C33 Specification for Concrete Aggregates.

E. ASTM C216 Specification for Facing Brick

F. ASTM C62 Standard Specification for Building Brick

1.4 SUBMITTALS

A. Submit samples of paving units to indicate color and shape selection.

B. Submit each sieve analysis for graded joint screenings and aggregate base.

C. Submit test results for compliance of paving unit requirements to ASTM C 936 from an independent laboratory.

D. The Landscape Architect will approve or not approve the proposed paver samples and mock up(s) within 7 days after receipt of the sample.

E. Do not deliver material to the construction site from any source until the Landscape Architect has approved the material from the source.

1.5 MOCK-UPS

A. Install one 10 ft. x 10 ft. paver area for each paving type. This area will be used to determine joint sizes, lines, laying pattern or patterns and color. This area shall be the standard from which the work will be judged. Mock-p may be a portion of the area(s) to be paved.

1.6 QUALITY ASSURANCE AND STANDARDS

A. Make the complete installation in accordance with all state and local municipal codes, all applicable codes and authorities having jurisdiction, and the applicable requirements and standards of the following:

1. ANSI American National Standards Institute

2. ASTM American Society for Testing and Materials

B. Installation shall be performed by an installer with at least five year's experience in placing concrete pavers.

C. Landscape Architect's Sampling and Testing: The Landscape Architect may elect to sample pavers and joint screenings to verify conformance to required parameters.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver concrete pavers to the site in steel banded, plastic banded, or plastic wrapped cubes with rubber mat to protect finish while stacked, capable of transfer by fork lift or clamp. Unload pavers at job site in such a manner that no damage occurs to the product or other site features.

B. Screenings shall be covered with waterproof covering to prevent exposure to rainfall or removal by wind. The covering shall be secured in place.

C. Store cementitious materials off the ground, under cover and in dry location.

D. Store aggregates where grading and other required characteristics can be maintained.

E. Store masonry accessories including metal items to prevent deterioration by corrosion and accumulation of dirt.

PART 2 PRODUCTS

2.1 BLUESTONE PAVERS

A. PAVERS: Pavers shall be salvaged from sidewalk. Sides shall be sawcut square and thermal finish applied to exposed surface.

B. MORTAR:

1. CEMENT: ASTM C 150, Type N Mortamix, color dark grey, as produced by Holcim (200). (800) 854-4656.

2. AGGREGATE FOR MORTAR: Shall be a sand conforming to ASTM C144 and meeting the following gradation.

Square Openings	Percent Passing
No. 4	100
No. 8	95-100
No. 16	70-100
No. 30	40-75
No. 50	10-35
No. 100	2-15
No. 200	0

3. WATER: Clean and potable.

C. CONCRETE: Meeting Specification 02770 Concrete Sidewalks and Curbs

2.2 BRICK PAVERS:

A. BRICK PAVERS: Pavers shall be a sand struck molded brick of 2 ¼" x 3 5/8" x 7 5/8" size meeting ASTM C 216, Grade SW, Type FBS and all grades of ASTM C 62. These products also conform to the requirements of ASTM C 216, Grade MW. Color: dark red/brown. Final color to be approved by Landscape Architect.

B. SETTING BED AND JOINT SCREENINGS: Shall be an angular, durable material composed of Traprock material such as basalt or diabase with uniform distribution of consistent materials and graded as follows:

Square Openings	Percent Passing
No. 4	85-100
No. 40	25-50
No. 100	10-30

2.3 BASE COURSE

A. Shall be a dense graded aggregate material as produced from recycled concrete aggregate which shall conform to the gradation and plasticity requirements as follows and with State Department of Transportation specifications.

Sieve Size	Percent
1 1/2"	100
3/4"	55-90
No. 4	25-60
No. 50	5-25
No. 200	3-12

B. Moisture content of dense graded aggregate immediately prior to placement shall be 6 plus or minus 2 percent based on dry weight.

C. When tested in accordance with AASHTO T 90, the portion passing the No. 40 sieve shall be nonplastic.

2.4 PAVER EDGE RESTRAINT: Where needed, edge restraint shall be PVC edge restraint acceptable for use with precast concrete pavers in straight and curved edge conditions. Restraint shall be designed so that it is buried below finish grade and secured with steel anchors to prevent lateral movement of pavers. See detail on Drawings.

2.5 FILTER FABRIC: Shall be a polyproplylene, needlepunched nonwoven geotextile meeting the following minimum standards:

PROPERTY	TEST METHOD	MIN. STANDARD
ORIGIN		
% U.S. Manufactured Inputs		100%
% U.S. Manufactured		100%
MECHANICAL		
Tensile Strength (Grab)	ASTM D-4632	80 lbs
Elongation	ASTM D-4632	50%
CBR Puncture	ASTM D-6241	210 lbs
Trapezoidal Tear	ASTM D-4533	30 lbs
ENDURANCE		
UV Resistance	ASTM D-4355	70%
% Retained at 500 hrs		
HYDRAULIC		
Apparent Opening Size	ASTM D-4751	50 US Std. Sieve

(AOS)[3]		
Permittivity	ASTM D-4491	2.0 sec^{-1}
Water Flow Rate	ASTM D-4491	150 gpm/ft^2

PART 3 EXECUTION

3.1 PREPARATION

A. EXAMINATION OF EXISTING CONDITIONS

1. Examine all work prepared by others to receive the work of this Division and report any defects affecting installation to the General Contractor or Construction Manager for correction.
2. Verify existing conditions and bring any discrepancies to Landscape Architect's attention in writing prior to submission.

3.2 ENVIRONMENTAL CONDITIONS

A. Do not install pavers during heavy rain or snowfall.

B. Verify gradients and elevations of base.

C. Verify location, type, installation and elevations of edge restraints around the perimeter area to be paved.

D. Beginning of installation means acceptance of base.

E. Verify locations of trees so that 12” square openings around trees fit pattern with minimal cutting of pavers.

3.3 INSTALLATION

A. SUBGRADE PREPARATION:

1. Fine grade the subgrade to within ± 1/2” of the required depth below the lines and grades shown on the drawings.
2. COMPACTION: After the subgrade has been established in all other areas, compact the top 12 inches of the subgrade to not less than 95% of maximum density as determined by the Modified Proctor Test ASTM D-1557-70. Adjust the water content of the top 12 inches by adding water or drying to within 2% of the optimum water content. Perform all grading and compaction in such a manner to produce a smooth, uniform, subgrade surface.
3. Do not prepare subgrade during freezing weather or when frozen, or when it is unstable because of excessive moisture.
4. When completed, the subgrade shall be at the proper grade and contour, firm, even and free from depressions that may form water pockets and shall be so maintained until the pavement is placed.

5. Should the subgrade material become contaminated or for any reason become unsuitable prior to placement of the pavement or plant material, correct or replace the subgrade material with the same soil material as specified for that area.

B. PAVERS ON BASE COURSE:

1. Do not construct base when the subgrade is frozen or when it is soft or unstable. Do not construct base during rainy or freezing weather or with frozen material.
2. Spread, compact, and grade base to within ± 1\2 inch of the sections and grades shown on the drawings.
3. Roll with Steel roller weighing not more than 5 tons compacting base course to not less than 95% of the maximum density as determined by the Modified Proctor Compaction Test, ASTM D1557-70.
4. If material is dry add 5-10 percent water by weight.
5. Protection of adjacent structures in or above proposed subgrade to preclude any damages during placement or compaction is the responsibility of the Contractor.
6. Should the base material become contaminated or for any reason become unsuitable prior to placement of the pavement, correct or replace the base material with satisfactory base material at no additional expense.
7. Install filter fabric uniformly over base with 6” overlaps at joints.
8. Spread setting bed using approved screenings while material is moist, uniformly covering the base course to a compacted depth not to exceed one inch.
9. Set pavers with hand tight joints in the desired pattern directly on the setting bed. The pattern should be checked with line every several feet and corrected if necessary.
10. Sweep joints with joint screenings and vibrate into bedding with a plate vibrator. Sweep surface again and repeat vibration until the joints are completely settled. Apply water lightly to the surface. Use a low amplitude, high frequency plate vibrator capable of 3000 to 5000 lbs. centrifugal compaction force to vibrate the pavers.
11. Where necessary cut pavers with double bladed splitter or masonry saw.
12. Fill gaps at the edges of the paved area with cut pavers.
13. The final surface elevations shall not deviate more than 1/8 to ¼“ maximum inch under a 10 foot long straight edge except at curb cut and along existing curbs and adjacent paving.

C. PAVERS OVER CONCRETE

1. Install concrete slab where shown on drawings in accordance with Section 03300 Cast-in-Place Concrete.
2. Spread setting bed to uniform thickness as shown on drawings.

3. Ensure that pavers are free of foreign materials before installation.
4. Lay the paving stones directly on setting bed as shown on drawings. Set pavers in the pattern as shown on the drawings. Maintain straight pattern lines and joints as indicated on drawings.
5. Cut paving stones where required with double bladed splitter or masonry saw.

END OF SECTION

SECTION 02825– WOOD FENCING

PART 1 GENERAL

1.1 The General Conditions of the Contract and Division 01, General requirements, apply to all the work specified in this Section.

1.2 SCOPE: Furnish all labor, materials and equipment required for the fabrication and installation of wood fencing as shown on the drawings and as specified herein.

1.3 RELATED WORK:

A. Cast in Place Concrete Section 03300

1.4 QUALITY ASSURANCE

A. All materials and construction methods shall conform to the standards specified by the American Society for Testing Materials (ASTM), National Association of Architectural Metal (NAAM) and American Iron, Steel Institute (AISI).

B. Warranty:

1. Steel Post: Provide manufacturer's standard limited warranty that its Steel Post is free from defects in material and workmanship for a period of 15 years from the date of purchase.

2. Wood Fence: 12 month warranty from date of final acceptance.

1.5 PREPARATION:

A. SUBMITTALS: Before commencing work, submit the following for approval.

1. Manufacturer's product specifications for products and processes used in railings, including finishes and paint.

2. Shop drawings: Submit drawings for fabrication and erection of railings. Include plans, elevations and details of fittings, connections, anchorages to other work. Provide templates for anchor and bolt installation by others.

3. Samples: Submit samples for each type of metal of same gauge and finish shown on drawings. Include 6" long samples of railing members, fittings and bracket.

PART 2 MATERIALS

2.1 Metal Post: Shall conform to "Master Halco PostMaster", ASTM A 653, coating designation G90 galvanized (zinc) coating as manufactured by:

2.2 Approved Manufacturer: Master Halco, Inc.
4000 W. Metropolitan Drive, Suite 400
Orange, CA 92868

B. Post: 3-1/2" (89mm) x 1-3/4" (44mm) 11 gauge [0.120" (3.05mm)] thick galvanized steel, roll formed steel shapes complying with ASTM A-653 having a 50,000 psi (344 MPa) yield strength and G90 zinc coating, 0.90 oz/fl^2 (o.27 kg/M^2). Punch thru holes: 13/64" Dia. 1" (25mm) OC. at both flanges.

C. Finish: Galvanized or Galvanized and polyester coated individually after drilling and layout, to ensure maximum corrosion protection. Posts are given a 4 stage

"Power Wash" pre-treatment process that cleans and prepares the galvanized surface to assure complete adhesion of the finish coat. All metal is then given a polyester resin based power coating applied by the electrostatic spray process, to a thickness 2.5 (.0635 mm) mils. The finish is then baked in a 450^0F (232^0C) (metal temperature) oven for 20 minutes. Color Brown

D. Wind Load: Product will meet minimum 70 MPH wind load when a 6' Privacy Fence is constructed with Posts every 8', set to the recommended depth in ground. Ref 1994 Uniform Building Code for Exposure "B".

2.3 POST SETTING MATERIALS

A. Concrete: Minimum 28 day compressive strength of 3,000 psi (20 Mpa).

B. Flanged Posts: Provide flange type base plates with 4 holes for surface mounting of posts where indicated.

2.4 WOOD RAILINGS AND FENCING

A. Northern White Cedar Grade No. 2 or better, certified to meet Forestry Stewardship Council (FSC) sustainable harvest requirements.

B. Fasteners and anchors: Provide size and type indicated on drawings and as recommended by applicable standards for nails, staples, screws, bolts nuts, washers and anchoring devices. All fasteners shall be galvanized.

2.5 SEALER

A. An oil based, semitransparent stain/sealer of paraffin oil, resins, pigments and algaecide such as "Readyseal" or approved equal. V.O.C. less than 1.9 lbs/gal, solids by volume 65%-69% and a life expectancy of 2-5 years. Color shall be Natural Cedar.

PART 3 INSTALLATION:

3.1 FABRICATION: Fabricate fencing & railings to design, dimensions and details shown on drawings. Discard units of material with defects which might impair quality of work.

3.2 INSTALLATION:

A. Space posts uniformly at 8' OC maximum unless otherwise indicated.

B. Concrete Set Posts: Drill hole in firm, undisturbed or compacted soil. Holes shall have diameter 4 times greater than nominal outside dimension of post, and depths approximately 12" (152 mm) deeper than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 24" (610 mm) below surface when in firm, undisturbed soil. Place concrete around post in a continuous pour. Trowel finish around posts and slope to direct water away from posts.

C. Gate Posts and Hardware: Set keepers, stops, sleeves and other accessories into concrete.

D. Check each post for vertical and top alignment, and maintain in position during placement and finishing operation.

E. Fit connections accurately together.

F. Adjust railing fit prior to anchoring to ensure matching alignment.

G. Place concealment board over installed Postmaster post as recommended by the Manufacturer. Attach boards by approved methods.

H. Protect finishes of railings from damage during construction. Restore finishes damaged during construction.

3.3 SEALING

A. Clean wood surfaces of dust, oil, and grease before sealer application. Wood must have less than 12% moisture content. Unseasoned wood must be allowed to weather before sealer application.

B. Take necessary precautions to protect plants, adjacent structures, water supplies and users as recommended by sealer manufacturer.

C. Apply sealer in method recommended by manufacturer, providing two coats over all wood fence parts taking. Seal board ends with three coats.

3.4 CLEANUP: Cleanup debris and unused material from site.

END OF SECTION

SECTION 02870 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 The General Conditions of the Contract and Division 01, General Requirements, apply to all the work specified in this Section.

1.2 SCOPE: Furnish all materials, equipment and labor required to install benches and bike rack.

A. Contractor shall coordinate all work to ensure proper sequencing and workmanship and to accommodate the work of all trades involved.

1.3 RELATED WORK OF OTHER SECTIONS

A. Concrete Section 03300

1.4 REFERENCES

A. ASTM A 536 – Standard Specification for Ductile Iron Castings

1.5 ABBREVIATIONS

A. FSC: Forestry Stewardship Council

1.6 SUBMITTALS: Before commencing work, submit the following for approvals.

A. Manufacturer's product information and specification information for all products/materials, assembly, fittings, and installation.

B. Certificates:

1. Wood Mill Certificate: Supply a certificate from the mill stating that the wood is produced from an IBAMA (Brazilian Institute for the Environment and the Renewal of Natural Resources) registered mill and that the wood is from legally harvested logs as defined under Brazilian Forest Code Law 4771 as regulated by IBAMA and the ITTO (International Timber Trade Organization) guidelines. (IBAMA insures mill compliance with legal guidelines for the management, production and export of tropical timbers); and in accordance with the Forest Steward Council (FSC) accredited certification, Ref Jersey City Ordinance 06-035.

2. Foundry Certificates: Supply a certificate from the foundry certifying the ductile iron used in bench standards meets the alloy and grade specified.

3. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

4. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

PART 2 PRODUCTS

2.1 BENCHES: All benches shall be break resistant Ductile Iron body. The tensile strength shall meet a minimum of 65,000 psi (448 MPa), in accordance with ASTM A536, Grade 65-45-12. Wood slats shall be FSC certified Ipe wood. 1939 New York World's Fair Bench Model # 6739E, eight (8) foot length.

A. Wood shall be thoroughly seasoned and shall contain not more than fifteen percent to twenty percent of moisture by weight. Lumber shall be in sound

condition, free from worm holes, knots, longitudinal heart cracks, firm or soft sap wood, fungus and deformation (twisting or cupping). Natural drying checks, to a maximum of 1/8 inch (3 mm) in width, will be acceptable. Dimensional tolerance (measured at 20 percent moisture content) shall be plus or minus .08 inch (2 mm) in both width and thickness.

5. Slats shall meet or exceed the mechanical properties as defined by U.S. Forest Product Laboratories testing methods (2 inches standard) as follows:

   Bending Strength: 22,560 psi (155 MPa).

   Modulus of Elasticity: 3,140,000 psi (21,650 MPa).

   minimum Crushing Strength: 13,010 psi (90 MPa).

6. Hardware: Bolts, nuts, and washers used to secure slats to standards shall be stainless steel. Anchor bolts used to secure the benches to pavements may be either stainless steel or hot-dipped galvanized steel.

7. Surfaces of the cast iron bench standards, bars and brace rods shall be powder coated with a polyester thermosetting Powder Coating as manufactured by Tiger Drylac, Sherwin Williams, PPG or Spraylat. Color: Black Forest Green, Sherwin Williams RAL 6012 black/green.

2.2 BIKE RACKS: Bicycle Rack shall be one-piece 2-inch i.d. schedule 40 stainless steel seamless pipe with a minimum wall thickness of 5/32 inch. Embedment mount (permanent) legs shall extend ten inches below finished grade and be drilled to accept No. 4 re-bar furnished by installing contractor. Bicycle Rack shape shall be derived from smooth six-inch radius mandrel bends. *Bending that distorts the pipe is not allowed.* Bicycle Rack shall be deburred and ground smooth after fabrication. Decorative metal base covers shall conceal pedestal bases and the anchor bolts furnished by installing contractor. Finish shall be stainless steel “CycleLoops” model # 2170-5-E-S, as produced by Timberform or approved equal.

PART 3 EXECUTION

3.1 INSTALLATION

A. BENCHES & BIKE RACK: Install and assemble in accordance with manufacturer's instructions to mounting heights, and in locations shown on the drawings. Cast-in-place concrete footing as recommended by the manufacturer, as specified under Section 03300, and as shown on the drawings. Set plumb and level.

B. GENERAL: Protect all site features during installation and the course of construction from chipping, fracture or other damage.

C. PROTECTION

1. Protect installed products until completion of project.
2. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 02920 - FINISH GRADING AND LAWN

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Furnish all labor, materials and machinery for the preparation of soil, seeding lawn, mulching and maintenance as shown on the drawings, and in the manner specified herein.

1.3 RELATED WORK OF OTHER SECTIONS

A. Earthwork Section 02300

B. Exterior Plants Section 02930

1.4 EXAMINATION OF EXISTING CONDITIONS

A. Examine all work prepared by others to receive the work of this Division and report any defects affecting installation to the General Contractor or Construction Manager for correction. Commencement of work will be construed as complete acceptance of preparatory work by others.

B. Verify existing conditions and bring any discrepancies to Owner's Representative's attention in writing prior to submission.

1.5 SUBMITTALS

A. All submittal shall be approved by Owner's Representative prior to commencement of work.

B. Project Schedule: Submit two (2) copies within ten (10) calendar days after the date specified for the commencement of work. Submit to the Owner's Representative, a proposed time schedule indicating dates for commencement and completion of the following operations:

Delivery of materials

Preparation of seedbeds

Planting seed

Maintenance

C. Samples: Submit two (2) sets of physical examples of the following products in the quantities indicated. Approved samples shall establish the standards by which the total work will be judged.

Topsoil One (1) Quart

Amendments One (1) Quart each

Lawn Seed Certification

D. Inspections and Reports: Submit soil analyst's test report on chemical and mechanical analysis of any additional topsoil to Owner's Representative for approval before delivery of additional material to the site.

E. Seed Certification: Seed certification tag shall be on every seed bag and shall provide as follows:

1. Name and address of labeler.
2. Kind or kind and variety of turfgrass seed. (kind refers to species of turfgrass)
3. Percentage by weight of each species (kind) and variety.
4. Germination percentage and date of test.
5. Percentage by weight of all weed seeds.
6. Percentage by weight of other crop seed.
7. Percentage by weight inert matter.
8. Lot number.
9. Name and amount of each kind of noxious
10. % Weed seed present.

F. Tests: Tests specified shall be performed by the New Jersey State Soil Testing Laboratory or other approved soil testing laboratory.

The Contractor will provide to Owner's Representative for approval a report on mechanical and chemical analysis of the topsoil and subsoil existing on the site. This report will serve as a basis for determining lime and/or superphosphate requirements for the subsoil and soil conditioner requirements for the existing topsoil prior to seeding.

1.1 Mechanical Analysis of Topsoil: Test any additional topsoil before delivery to the site. Tests shall be performed by a qualified soils analyst or engineer in accordance with ASA designations for particle size, to include percentage of sand, silt, clay, organic matter content and pH.

1.2 Submit topsoil for chemical analysis after incorporation of soil conditioners to determine lime and fertilizer requirements to County or State soil testing service. Two copies of the fertilizer and liming recommendation report shall be submitted to the Owner's Representative.

1.6 HANDLING AND STORAGE

A. Products shall be delivered, stored and otherwise handled and protected in a manner to prevent damage.

B. Store materials only in designated areas of site.

C. Store and protect topsoil mixture and other materials at designated area of the site. Protect topsoil mixture from excessive leaching, if stored more than 6 weeks, by covering with tarpaulin.

PART 2 PRODUCTS

2.1 TOPSOIL: Natural, fertile, friable soil, representative of local productive soil, and 90% free of clay lumps, subsoil or other foreign matter larger than two inch diameter; not frozen or muddy; acidity range pH 6-7, not less than 3% organic matter as determined by loss on ignition of moisture-free samples dried at 100 degrees Centigrade. Gravel portion (particles larger than 2 mm) not to exceed 15% of total volume. Mechanical analysis of material passing 2 mm sieve to have the following maximum percentage by dry weight of constituent materials:

Soil Separate	Particle Size	Maximum Percentage
Sand	2 to 0.5 mm	85
Silt	.05 to .002 mm	35
Clay	.002 and smaller	20

Use topsoil from stockpiles at the site or provide new topsoil as required to achieve a minimum six (6) inches depth of topsoil in new seeding areas. Improve topsoil to meet mechanical requirements. Add compost, peat moss or other approved organic soil conditioner to topsoil at a rate of 3 parts topsoil to one part compost.

2.2 LIME: Finely ground agricultural or granulated lime (slow release and dustless) ground so that 50% passes 100 mesh sieve and 90% 20 mesh sieve. Coarser material will be acceptable provided the specified rates of application are increased proportionately on the basis of quantities passing the 100 mesh sieve. Dolomitic limestone to be used when magnesium content of the soil is low.

2.3 SUPERPHOSPHATE: Granular, dry, free flowing, normal superphosphate (18-20% P O), delivered in original bags.

2.4 SAND: Clean, coarse, well-graded material ranging in size from .1-2 mm, meeting the requirements of ASA for fine aggregates

2.5 SEED: Clean delivered in original unopened packages and bearing an analysis of the contents, guaranteed 95% pure and to have a minimum germination rate of 85% within 1 year of test. Seed Mix shall be Formula of equal parts of three types of Turf Type Tall Fescue Seed recommended for New Jersey.

2.6 STRAW MULCH: Unrotted, weed seed free wheat, oat, rye or salt hay.

2.7 COMPOST: Well decomposed stable, weed free, organic material.Product shall contain no pytotoxic substances. Compost shall possess no objectionable odors and shall not resemble raw material from which it was derived. Compost shall be derived from agricultural products, food or individual residuals, biosolids, yard trimmings or source-separated or mixed solid waste. Material shall also meet the following:

pH	5.5-7.0
moisture	35% - 55%
particle size	100% passing 1" sieve
stability	highly stable
Soluble salts	less than 2.5 mmhos/cm

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

A. After rough grading is completed and before approved topsoil mixture is spread, apply lime at the rate of 20 lbs./1000SF and superphosphate at the rate of 25 lbs./1000SF and thoroughly scarify ground to a minimum depth of 8 inches with a toothed ripping machine by running in two directions at right angles over the entire surface to be planted.

B. Remove all trash, construction debris and stones exceeding 3 inches in diameter from area to depth of 2 inches after ripping.

3.2 TOPSOIL AND FINISH GRADE

A. Apply fertilizer, lime and organic matter as recommended by soil analysis.

B. Thoroughly mix the applied topsoil and additives to a depth of 8 inches by running a rototiller over the entire area in two directions at right angles.

C. Spread topsoil under canopies of existing trees to remain by hand. Care must be taken not to damage roots.

D. Rake the topsoil area to a uniform grade so that all areas drain (as indicated on the grading plan). Lightly compact with a cultipacker.

E. Remove all trash and stones exceeding 2 inches in diameter from area to depth of 2 inches prior to preparation and sowing seed.

3.3 SEEDING

A. Apply grass seed between the dates of April 1 and May 31 or August 15 and October 10.

B. Apply seed for lawn areas at the rate of 10lbs. per 1000 square feet or 435 lbs/acre immediately after final soil preparation.

C. Mechanical Seeding: Planting of seed shall be done using a brillion type seeder or windmill seeder. Seed shall be applied in two directions at right angles to each other. After seed has been spread lightly rake seeded area ¼" deep and lightly roll to improve soil/seed contact. Apply a ½-inch layer of straw mulch (50 – 90 lbs (1-2 bales) per 1000 SF). There should be approximately 25% of soil area visible trhough the mulch. Crimp straw and apply tackifier to prevent blowing.

PART 4 MAINTENANCE

4.1 MAINTENACE PERIOD: Begin maintenance immediately after each portion of lawn is planted and continue maintaining until final acceptance.

4.2 MAINTENANCE OPERATIONS

A. Water to keep surface soil moist.

B. Repair washed out areas by filling with topsoil, liming, fertilizing and reseeding.

C. Mow to 2 inches after grass reaches 3 inches in height, and mow frequently enough to keep grass from exceeding 3 1/2 inches.

D. Weed by local spot application of selective herbicide only after grass is well-established.

4.3 LAWN GUARANTEE

A. If at the end of 8 weeks after initiation of lawn maintenance period, a satisfactory stand of grass has not been produced, the Contractor shall renovate and seed the lawn or unsatisfactory portions thereof immediately, or, if after 15 November, during the next planting season

B. A satisfactory stand is defined as a lawn or section of lawn of 1,000 square feet or larger that has.

C. No bare spots larger than 0.5 square feet.

D. Not more than 5% total area with bare spots larger than .25 square foot.

E. Not more than 10% of total area with bare spots larger than 3 inches square.

4.4 INSPECTIONS FOR ACCEPTANCE OF WORK

A. Upon final inspection of the project the Owner's Representative will make an inspection of the lawn to determine if a satisfactory stand of grass has been produced.

B. If a satisfactory lawn has not been established, another inspection will be made after written notice from the Contractor that the lawn is ready for inspection following the next growing season.

END OF SECTION

SECTION 02930 – EXTERIOR PLANTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Special Conditions and Division I Specifications, apply to this Section.

1.2 SUMMARY

A. This section includes preparation, maintenance and planting of trees, shrubs and groundcovers.

B. RELATED WORK OF OTHER SECTIONS

1. Earthwork Section 02300
2. Finish Grading and Lawn Section 02920

1.3 REFERENCES

ANSZ 60.1-2004 American Standards for Nursery Stock

ASTM D422-63 Standard Method for Particle Size Analysis of Soils

1.4 ABBREVIATIONS

B & B: Balled and burlapped.

Cal: The caliper of the main trunk in inches IAW ANSI Z 60.1-2004

CY: Cubic yard, not compacted

AAN: American Association of Nurserymen

ASA: American Society of Agronomy

ASTM: American Society for Testing and Materials

1.5 PLANTING CONTRACTOR QUALIFICATIONS: Only a firm with a minimum of five (5) years of successful experience in the installation and transplanting of trees similar to or larger in size and scope than this project will be accepted. Submit qualifications including at least three past clients on projects with its scope for review and approval by the Owner's Representative.

1.6 PLANT SUBSTITUTIONS: If a plant is not available, the Landscape Contractor is to notify the Owner's Representative during bidding. The Owner's Representative will then select a reasonable alternate. Failure to notify Owner's Representative does not relieve the contractor from supplying scheduled material.

1.7 PREPARATION

A. EXAMINATION OF EXISTING CONDITIONS

1. Examine all work prepared by others to receive the work of this Division and report any defects affecting installation to the General Contractor or Construction Manager for correction. Commencement of work will be construed as complete acceptance of preparatory work by others.

2. Verify existing conditions and bring any discrepancies to Owner's Representative's attention in writing prior to submission.

1.8 SUBMITTALS

A. All submittal shall be approved by Owner's Representative prior to commencement of work.

B. Project Schedule: Submit two (2) copies within ten (10) calendar days after the date specified for the commencement of work. Submit to the Owner's Representative, a proposed time schedule indicating dates for commencement and completion of the following operations:

Submission of tests and samples
Tagging of plants in the nurseries
Survey and staking of plant locations
Delivery of topsoil and other materials
Digging and preparation of plant pits and beds
Delivery of trees, shrubs & groundcover to the site
Planting of trees, shrubs and groundcover
Completion of work for start of guarantee period

C. At least ten (10) days before start of guarantee period submit a schedule of proposed maintenance operations indicating the number of staff hours contemplated for each operation by season during autumn, winter, spring and summer

D. Submit proof of manufacturer's guaranteed analysis of fertilizer delivered to the site.

E. Soil Testing Laboratory: Submit for approval by Owner's Representative name of testing agency or laboratory and qualifications at least one month prior to soil sampling and testing.

Samples:

1.	Organic mulch	3 lbs.
2.	Topsoil	One (1) Quart
3.	Compost	One (1) Quart

1.9 TESTS: Tests specified shall be performed by a State Soil Testing Laboratory, or qualified soil agronomist, engineer or other approved soil testing laboratory in accordance with ASA designations.

A. Chemical and Mechanical Analysis of on site topsoil: Mechanical analysis and chemical analysis in accordance with ASA designations and shall include: chemical analysis showing fertility testing for nitrogen, phosphate, potassium, ammonium, calcium, magnesium, boron and sodium absorption ratio, organic matter, topsoil, percent sand, silt and clay, pH and soluble salt in ppm.

B. Chemical and Mechanical Analysis of compost material in accordance with ASA designations including testing for nitrogen, phosphate, potassium, ammonium,

calcium, magnesium, boron and sodium absorption ratio, pH and soluble salt in ppm.

1.10 REPORTS: The Contractor will provide the following for Owner's Representatives approval prior to installation of material:

A. Mechanical and Chemical analysis of existing topsoil as designated in paragraph 1.9.

B. Mechanical and Chemical analysis of compost.

1.11 INSPECTIONS

A. Notify Owner's Representative of sources of plant materials at least three (3) weeks prior to anticipated delivery schedule. Inspect and tag plants at the source of supply before notifying Owner's Representative of availability for inspection. Owner's Representative will inspect plants at source of supply.

B. Report Data: Written reports of each inspection, test or similar service shall include, but not limited to the following:

1. Name of testing agency or laboratory.
2. Dates and locations of samples, tests or inspections.
3. Names of individuals making the inspection.
4. Designation of the work and test method.
5. Test results to include but not limited to the following: Mechanical and Chemical analysis shall provide all information designated in paragraph 1.9. Report shall also indicate quantity of lime and quantity and composition of fertilizer to add for growing the types of plants listed in the Schedule of Plant Materials, and density of installed compacted soil.
6. Interpretation of test results
7. Comments or professional opinion as to whether inspected or tested work complies with requirements of the contract documents.

1.12 HANDLING AND STORAGE: Products shall be delivered, stored and otherwise handled and protected in a manner to prevent damage.

A. Method of delivery:

1. Balled and Burlapped Plants: Dig plants designated B & B in Schedule of Plant Material by hand, with firm, natural balls of earth of diameter and depth sufficient to encompass the fibrous and feeding root system necessary for full recovery of plant. Firmly wrap balls with non treated burlap and bind with twine, cord or wire mesh.
2. Plant Protection: If plants are not in dormant state, spray all plants with anti-desiccant to cover foliage as recommended by manufacturers, prior to digging plants. When transporting, cover with tarpaulin or other suitable covering to prevent excessive drying from sun and wind.
3. Accompany shipments of plant materials with all certificates of inspection of plants required by Federal or State Regulations.

4. Delivery and Storage: Inspect materials delivered to site for damage, unload and store with minimum of handling. Do not store materials directly on the ground.

B. Preparation and Storage of Materials:

Cover balls of "B & B" and potted plants that cannot be planted immediately upon delivery with moist mulch to protect from drying. Water plants as often as necessary to prevent drying until planted.

1.13 TIME OF PLANTING: Begin at least one week before delivery of plants to site to prepare topsoil for plant pits and beds. Thereafter conduct planting operations under favorable weather conditions except during the months of December, January, February, June July and August.

PART 2 - MATERIALS

2.1 TOPSOIL: Natural, fertile, friable loam or sandy loam soil, as required by soil physical analysis representative of local productive soil, and 90% free of clay lumps, subsoil or other foreign matter larger than one inch diameter; not frozen or muddy. Acidity range pH 6.5 to 7, exchangeable calcium less than 600 ppm, organic matter between 4 & 5% as determined by loss on ignition of moisture free samples dried at 105 degrees Centigrade; clay content not more than 25% of material passing the No. 4 sieve. Soluble salts shall not exceed 1.5 dS/M.

2.2 SAND: Clean, coarse, graded 1-2 mm, meeting the requirements of ASA for fine aggregate.

2.3 ORGANIC MULCH: Shall be a decomposed shredded hardwood bark mulch composed of hardwood, cedar and hemlock blend, free from stones, sticks, phytotoxic substances, and stabilized with nitrogen.

2.4 FERTILIZER: A commercial fertilizer containing 5% nitrogen, 10% available phosphoric acid and 5% potash unless soil tests indicate need for different composition. Conform to applicable state fertilizer laws and standards of AoAc, uniform in composition, dry, free flowing and delivered in original, unopened containers bearing manufacturer's guaranteed analysis.

2.5 LIME: Finely ground agricultural or granulated lime (slow release and dustless) ground so that 50% passes 100 mesh sieve and 90% 20 mesh sieve. Coarser material will be acceptable provided the specified rates of application are increased proportionately on the basis of quantities passing the 100 mesh sieve. Dolomitic limestone to be used when magnesium content of the soil is low.

2.6 BONEMEAL: Shall be a finely ground, steamed bone product containing from 2 to 4 percent nitrogen and 16 to 14 percent phosphoric acid.

2.7 GRANULAR SULFUR: A finely granular dustless product that is minimum 96% pure.

2.8 CHEMICAL INHIBITORS

A. Anti-desiccant: Shall be an emulsion which will produce a protective film over plant surfaces; permeable enough to permit transpiration such as "Wilt-Pruf", manufactured by Nursery Products Specialties Co., Croton Falls, New York, or

other approved equal. It shall be delivered in the containers of the manufacturer and mixed according to the manufacturer's direction.

B. Selective Herbicide: A municipality approved medium, developed specifically to kill herbaceous weeds and seedlings. Herbicides shall be applied strictly in accordance with manufacturer's recommendations and application instructions.

C. Pre-emergent Herbicide: Only to be used upon written approval of Owner's Representative.

D. Fungicides: Only to be used upon written approval of Owner's Representative.

2.9 PLANT MATERIALS

A. Nomenclature: Names of plants required under this Contract conform to those given in Hortus Third 1976 or Hortus Second 1972, by L. H. Bailey. Names of varieties not included therein conform with names generally accepted in the nursery trade.

B. Quality and Size: Nursery grown, habit of growth that is normal for the species, sound, healthy, vigorous and free from insects, diseases, and injuries. Equal to or exceeding measurements specified in plant list. Plants shall be provided that have a ratio of height to spread as recommended by the ANSZ 60.1-2004. Plants measured before pruning with branches in normal position; necessary pruning done at time of planting as recommended by the Owner's Representative. Sizes and methods of handling according to the code of standards recommended by the AAN; ball sizes as indicated in Schedule of Plant Material.

C. Substitutions: The Owner's Representative is to approve all substitutions.

D. Size: Plants shall be furnished in size indicated. Plants larger in size than specified may be provided at no additional cost to the Owner.

2.10 COMPOST: Well decomposed stable, weed free, organic material.Product shall contain no pytotoxic substances. Compost shall posess no objectionable odors and shall not resemble raw material from which it was derived. Compost shall be derived from agricultural products, food or individual residuals, biosolids, yard trimmings or source-separated or mixed solid waste. Material shall also meet the following verified by certified test results:

pH	5.5-7.0
moisture	35% - 55%
particle size	100% passing 1" sieve
stability	highly stable
soluble salts	less than 2.5 mmhos/cm

2.11 MINOR MATERIALS: Accessories or other materials not described, but required for completed work, shall conform to commonly accepted industry standards and shall be of types and sizes best suited for the intended purpose and related conditions.

PART 3 EXECUTION

3.1 SITE PREPARATION

A. Before beginning planting operations, take all necessary measures to protect walks and structures from damage.

B. Install Topsoil where shown on drawings in 6" lifts, compacting Topsoil to 85% of the maximum density as determined by the Modified Proctor Test , ASTM-D1557-704. Amend onsite topsoil as required by the soil analysis recommendations.

C. Location of Plants: Locate new planting where shown on plans except where obstructions below ground are encountered or where changes have been made in the construction; then make necessary adjustments as approved by Owner's Representative. Necessary changes in location must be approved in writing prior to planting. Where spacing dimensions or location are not clear, notify the Owner's Representative before installation.

D. Plant Pits: Excavate tree and shrub pits in topsoil with tapered sides. Remove excess excavated material from site. Width of pits for all trees to be at least 2' greater than diameter of rootball. Depth of pits for trees to be as shown in details. Shrub pits shall be excavated 1' wider than edge of root balls, and as deep as rootball. When pits are dug with auger and sides of the pits become glazed, the glazed surface shall be scarified.

3.2 SUBGRADE PREPARATION

A. Do not construct when the subgrade is frozen or when it is soft or unstable. Do not construct during rainy or freezing weather or with frozen material.

B. Compact and grade subgrade to within ± 1/2 inch of the sections and grades shown on the drawings.

C. Compact subgrade to not less than 95% of the maximum density as determined by the Modified Proctor Compaction Test, ASTMD1557-70.

D. Protection of trees and adjacent structures in or above the proposed subgrade to preclude any damages during placement or compaction is the responsibility of the Contractor.

E. Should the subgrade material become contaminated or for any reason become unsuitable prior to placement of the pavement, correct or replace the subgrade material with satisfactory subgrade material at no additional expense.

3.3 INSTALLATION

A. Setting Plants: Plants shall be set plumb and held in position until sufficient soil has been firmly placed around roots or ball. Plants shall be set in relation to surrounding grade so that they are at the elevation shown on drawing. Setting any plants higher than surrounding grade will require resetting to acceptable elevation at Contractor's expense. Handle all plants by the earth ball only. Handling by the stem or foliage will cause for rejection of the plant. All earth balls shall be firm and undamaged. Cracked or crushed balls shall be rejected.

B. Balled and Burlapped Plants: Materials shall be removed that are metal, plastic, nylon or treated burlap and twine, prior to backfilling. Balled and burlapped stock shall be backfilled with topsoil to approximately half the depth of the ball and then tamped and watered. Biodegradable burlap and tying material shall be carefully opened and folded back. The backfill shall be completed, tamped and

watered in 6" lifts to not less than 85% of the maximum density as determined by ASTM D-1556.

C. Container-Grown, Balled and Platformed and Balled and Potted Plants: Non-biodegradable containers or platforms shall be removed without damage to the plant or root system. Biodegradable containers shall be split. The backfill shall be completed as specified for B&B plants.

D. Groundcover: Groundcover may be planted after the mulch is in place. Contaminating the mulch with soil shall be avoided.

E. Do not apply tree wrap to trunk.

F. Pruning and Repair: After trees are planted prune and repair injuries to all trees. Do not prune until given approval by the Owner's Representative. Limit amount of pruning to minimum necessary to remove dead or injured twigs and branches and to compensate for the loss of roots as a result of transplanting operations. Prune in such a manner as not to change natural habit or shape of plant. Make cuts flush leaving no stubs. On all cuts over 3/4" in diameter and bruises or scars on bark, trace the injured cambium back to living tissue and remove; smooth and shape wounds so as not to retain water. Do not apply pruning paint or wound dressing.

3.4 RESTORATION AND CLEANUP

A. If ground settles in planting pits, fill with additional soil material to level of finish grade.

B. Restoration: Turf areas, pavements and facilities that have been damaged from the planting operation shall be restored to original condition at the Contractors expense.

C. Clean up: Excess and waste material from the planting operation shall be removed and disposed of off site. Adjacent paved areas shall be cleared.

PART 4 MAINTENANCE

4.1 Begin maintenance immediately after each plant is installed and continue to maintain until the end of the guarantee period.

4.2 MAINTENANCE OPERATIONS

A. Watering as often as required to maintain capillary water within 2" of the soil surface around plants. Water so rootball and surrounding soil is moistened to promote root growth out from rootball.

B. Weeding of planting beds and tree pockets by hand methods.

C. Resetting plants to proper grades or upright position.

D. Seasonal spraying to control fungus, disease or insect pests that may impair plants' vigor.

E. Restoration of planting pits.

F. Replacement of plants required by the Plant Guarantee on a regular monthly basis except during the months of December, January, February, June July and August.

4.3 PLANT GUARANTEE

A. Guarantee all plants to be alive and in vigorous growing condition for a minimum of two (2) growing seasons from date of Acceptance For Start of Maintenance to review for Final Acceptance. Growing season defined by HEPSCD.

B. Remove unsatisfactory plants and replace with plants of the same kind, quality, and size as specified in the Schedule of Plant Materials.

C. Furnish and plant as specified under Execution.

D. Guarantee all plant replacements to be alive and in vigorous growing condition two growing seasons after replacement. Guarantee any replacements for two (2) growing seasons or until 100% of the planting has as individuals become established for two (2) growing seasons guarantee period.

E. Cost shall be borne by Contractor, except for possible replacements resulting from (1) removal, (2) loss or damage due to occupancy of project in any part, (3) vandalism, or (4) acts of neglect on part of others.

4.4 INSPECTIONS FOR ACCEPTANCE OF WORK

A. Acceptance For Start Of Maintenance: The Contractor shall notify the Owner's Representative in writing of completing construction. Within 15 days after completion, an inspection for acceptance to start the guarantee period will be made. When the work is accepted, the maintenance period will begin and continue until final acceptance.

B. Final Acceptance: The Contractor shall notify the Owner's Representative within 20 days of the date for final inspection at the end of the maintenance period, and an inspection will be arranged within 15 days of this date. Before final acceptance, the terms of the Plant Guarantee must be met and the project site must be in the conditions stipulated under Maintenance Operations. All tree support material shall be removed prior to Final Inspection.

END OF SECTION

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Under this section, the Contractor shall provide all labor, equipment and material necessary to furnish cast-in-place concrete work, complete in place, and as shown on the Contract Drawings, specified herein and approved by the Architect.

In general, work to be included under this section shall include, but not be limited to, the following:

1. Concrete vertical curb
2. Alternate "A": Concrete floor slab at shed
3. Concrete column forms
4. Concrete reinforcement, materials, mix design, placement procedures, and finishes.
5. Concrete pads under benches

B. Related Sections:

1. Excavation Support and Protection Section 02260

1.2 RELATED DOCUMENTS

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

1.3 SUBMITTALS

A. Product Data: For each manufactured material and product indicated.

B. Shop Drawings: Include details of steel reinforcement placement including material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports.

C. Material certificates.

D. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design test.

1.4 PLANT, EQUIPMENT, MACHINES, AND TOOLS

A. Plant, equipment, machines, and tools used in the work shall be subject to approval and shall be maintained in a satisfactory working condition at all times. The equipment shall

have the capability of producing the required product, meeting grade controls, thickness control and smoothness requirements as specified. Use of the equipment shall be discontinued if it produces unsatisfactory results. The Engineer shall have access at all times to the plant and equipment to ensure proper operation and compliance with specifications.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed concrete work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

F. Comply with ACI 301, "Specification for Structural Concrete," including the following, unless modified by the requirements of the Contract Documents.

1. General requirements, including submittals, quality assurance, acceptance of structure, and protection of in-place concrete.
2. Formwork and form accessories.
3. Steel reinforcement and supports.
4. Concrete mixtures.
5. Handling, placing, and constructing concrete.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Formwork: Furnish formwork and form accessories according to ACI 301.

B. Concrete Column Forms: Sonotube Concrete Forms. Basis of Design - Product
   1. Description: Multiple layers of 100 percent recycled paperboard, spirally wound, and laminated with adhesive.
   2. Interior Surface: Smooth with spiral seam. Moisture barrier plastic coating
   3. Exterior Surface:
      a. Sonotube RainGuard – 100 percent recycled paper.
      b. Sonotube Commercial – Moisture Barrier outer label.
   4. Forms will impart visible spiral mark on concrete columns
   5. 1-piece, 1-time-use forms.
   6. Recyclable.

C. Steel Reinforcement:

   1. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
   2. Plain –Steel Wire: ASTM A 82, as drawn.
   3. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
   4. Deformed-Steel Welded Wire Fabric: ASTM A 497, flat sheet.

D. Concrete Materials:

   1. Portland Cement: ASTM C 150, Type I.
   2. Normal-Weight Aggregate: ASTM C 33, uniformly graded, not exceeding 1-1/2-inch (38-mm) nominal size.
   3. Water: Complying with ASTM C 94.

E. Admixtures:

   1. Air-Entraining Admixture: ASTM C 260.

F. Curing Materials:

   1. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
   2. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf.
   3. Moisture-Retaining Cover: ASTM C 171, white opaque polyethylene film or white burlap-polyethylene sheet.
   4. Water: Potable.
   5. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

G. Related Materials:
   1. Contraction joint filler for curb and gutter shall consist of hard-pressed fiberboard.
   2. Expansion-Joint Filler, premolded, and Isolation-Joint Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork, 3/8 inch thick, unless otherwise indicated.

H. Joint Sealants:
   1. Joint sealant, cold-applied shall conform to ASTM C 920.
   2. Joint sealant, hot-poured shall conform to ASTM D 3405.

I. Vapor Retarders
   1. Sheet Vapor Retarder (at foundation walls): Polyethylene sheet, ASTM D 4397, not less than 10mils (0.25 mm) thick
   2. Sheet Vapor Retarder (below slab): Polyethylene sheet, ASTM E 1643, 6mils.

2.2 CONCRETE MIXES

A. Comply with ACI 301 requirements for concrete mixtures.

B. Prepare design mixes, proportioned according to ACI 301, for normal-weight concrete determined by either laboratory trial mix or field test data bases, as follows:

   1. Compressive Strength (28 Days): 4000 psi (20.7 MPa).
   2. Slump: 3 inches (100 mm).
   3. Min. Cementitious Materials content: 540 lb/Cu.YD (320 KG/Cu.M.)

C. Maximum Water-Cement ratio: 0.45

D. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 6.0 percent within a tolerance of plus 1.0 or minus 1.5 percent.

   1. Air content of trowel-finished interior concrete floors shall not exceed 3.0 percent.

2.3 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with ASTM C 94.

   1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Not permitted.

C. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

2.4 CONCRETE PROTECTION MATERIALS

A. Concrete protection materials shall be a linseed oil mixture of equal parts, by volume, of linseed oil and mineral spirits. At the option of the contractor, commercially prepared linseed oil mixtures, formulated specifically for application to concrete to provide protection against the action of deicing chemicals may be used, except that emulsified mixtures are not acceptable.

2.5 FORM WORK

A. General: Form work shall be designed and constructed to ensure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified. Forms shall be of wood or steel, straight, of sufficient strength to resist springing during depositing and consolidating concrete. Wood forms shall be surfaced plank, 2 inches nominal thickness, straight and free from warp, twist, loose knots, splits or other defects. Wood forms shall have a nominal length of 10 feet. Radius bends may be formed with 3/4 inch boards, laminated to the required thickness. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points. Ends of steel forms shall be interlocking and self-aligning. Steel forms shall include flexible forms for radius forming, corner forms, form spreaders, and fillers. Steel forms shall have a nominal length of 10 feet with a minimum of 3 welded stake pockets per form. Stake pins shall be solid steel rods with chamfered heads and pointed tips designed for use with steel forms.

B. Curb forms shall have a height equal to the full depth of the curb. The inside form of curb shall have batter as indicated and shall be securely fastened to and supported by the outside form. Rigid forms shall be provided for curb returns, except that benders or thin plank forms may be used for curb or curb returns with a radius 10 feet or more, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90 degrees cannot be used. Back forms for curb returns may be made of 1-1/2 inch benders, for the full height of the curb, cleated together. In lieu of inside forms for curbs, a curb "mule" may be used for forming and finishing this surface, provided the results are approved.

PART 3 - EXECUTION

3.1 SUBGRADE PREPARATION

A. General: The subgrade shall be constructed to the specified grade and cross section prior to concrete placement. Subgrade shall be placed and compacted in conformance with Section 02221, EXCAVATION, BACKFILLING AND COMPACTING.

B. Curb and Gutter Subgrade: The subgrade shall be tested for grade and cross section by means of a template extending the full width of the curb and gutter. The subgrade shall be of materials equal in bearing quality to the subgrade under the adjacent pavement.

C. Maintenance of Subgrade: The subgrade shall be maintained in a smooth, compacted condition in conformity with the required section and established grade until the concrete is placed. The subgrade shall be in a moist condition when concrete is placed. The subgrade shall be prepared and protected to produce a subgrade free from frost when the concrete is deposited.

3.2 INSTALLATION, GENERAL

A. Formwork: Design, construct, erect, shore, brace, and maintain formwork according to ACI 301. Forms shall be set to the indicated alignment, grade and dimensions. Forms shall be held rigidly in place by a minimum of 3 stakes per form placed at intervals not to exceed 4 feet. Corners, deep sections, and radius bends shall have additional stakes and braces, as required. Clamps, spreaders, and braces shall be used where required to ensure rigidity in the forms. Forms shall be removed without injuring the concrete. Bars or heavy tools shall not be used against the concrete in removing the forms.

1. Any concrete found defective after form removal shall be promptly and satisfactorily repaired. Forms shall be cleaned and coated with form oil each time before concrete is placed. Wood forms may, instead, be thoroughly wetted with water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory.

B. Curbs: The forms of the front of the curb shall be removed not less than 2 hours nor more than 6 hours after the concrete has been placed. Forms back of curb shall remain in place until the face and top of the curb have been finished, as specified for concrete finishing.

C. Vapor Retarder: Install, protect, and repair vapor-retarder sheets according to ASTM E 1643; place sheets in position with longest dimension parallel with direction of pour.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
2. Cover vapor retarder with fine-graded granular material, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch (0 mm) or minus 3/4 inch (19 mm).

D. Steel Reinforcement: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

E. Joints: Construct joints true to line with faces perpendicular to surface plane of concrete.

1. Construction Joints: Locate and install so as not to impair strength or appearance of concrete, at locations indicated or as approved by Architect.
2. Isolation Joints: Install joint-filler strips at junctions with slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
   a. Extend joint fillers full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
   b. Install SNAP-CAP to form straight, uniform joints. After removal, seal with Sikaflex 1A or approved equal.

3. Contraction (Control) Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
   a. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to a radius of 1/8 inch (3 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
   b. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

F. Tolerances: Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

3.3 FORM SETTING

A. General: Forms shall be set to the indicated alignment, grade and dimensions. Forms shall be held rigidly in place by a minimum of 3 stakes per form placed at intervals not to exceed 4 feet. Corners, deep sections, and radius bends shall have additional stakes and braces, as required. Clamps, spreaders, and braces shall be used where required to ensure rigidity in the forms. Forms shall be removed without injuring the concrete. Bars or heavy tools shall not be used against the concrete in removing the forms.

1. Any concrete found defective after form removal shall be promptly and satisfactorily repaired. Forms shall be cleaned and coated with form oil each time before concrete is placed. Wood forms may, instead, be thoroughly wetted with water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory.

B. Curbs: The forms of the front of the curb shall be removed not less than 2 hours nor more than 6 hours after the concrete has been placed. Forms back of curb shall remain in place until the face and top of the curb have been finished, as specified for concrete finishing.

3.4 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.5 FINISHING FORMED SURFACES

A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Completely remove fins and other projections.

1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.
2. Apply smooth-rubbed finish, defined in ACI 301, to smooth-formed finished concrete.

B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.6 FINISHING UNFORMED SURFACES

A. General: Comply with ACI 302.1R for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on the surface.

1. Do not further disturb surfaces before starting finishing operations.

C. Scratch Finish: Apply scratch finish to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, portland cement terrazzo, and other bonded cementitious floor finish, unless otherwise indicated.

3.7 FINISHING FLOORS AND SLABS

A. Float Finish: Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

B. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view.

2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch (6 mm).

C. Nonslip Broom Finish: Apply a nonslip broom finish to surfaces indicated and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

3.8 CURB CONCRETE PLACEMENT AND FINISHING

A. Formed Curb: Concrete shall be placed to the section required in a single lift. Consolidation shall be achieved by using approved mechanical vibrators.

B. Curb Finishing: Approved slipformed curb machines may be used in lieu of hand placement.

C. Concrete Finishing: Exposed surfaces shall be floated and finished with a smooth wood float until true to grade and section and uniform in texture. Floated surfaces shall then be brushed with a fine-hair brush with longitudinal strokes. The edges of the top of the curb shall be rounded with an edging tool to a radius of 1/2 inch. Immediately after removing the front curb form, the face of the curb shall be rubbed with a wood or

D. Joint Finishing: Curb edges at formed joints shall be finished as indicated.

E. Surface and Thickness Tolerances: Finished surfaces shall not vary more than 1/4 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

F. Reinforcement Steel Placement: Reinforcement steel shall be accurately and securely fastened in place with suitable supports and ties before the concrete is placed.

3.9 CURB AND JOINTS

A. General: Curb and gutter joints shall be constructed at right angles to the line of curb.

B. Contraction Joints(Blind) shall be constructed by means of 1/8 inch thick separators and of a section conforming to the cross section of the curb. Separators shall be removed as soon as practicable after concrete has set sufficiently to preserve the width and shape of the joint and prior to finishing.

C. Expansion joints shall be formed by means of preformed expansion joint filler material cut and shaped to the cross section of curb and gutter.

1. Expansion joints shall be provided in curb at least 3/8 inch in width and shall be provided at intervals not exceeding 20 feet.

3.10 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures for at least 7 days from the beginning of the curing operation. Comply with ACI 306.1 for cold-weather protection, and follow recommendations in ACI 305R for hot-weather protection during curing.

B. Unhardened concrete shall be protected from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready for use before actual concrete placement begins.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions occur before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

D. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

E. Cure formed and unformed concrete for at least seven days by one of the methods as follows:

1. Moisture Curing: Keep surfaces continuously moist with absorptive cover, water saturated and kept continuously wet.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

F. Backfilling: After curing, debris shall be removed and the area adjoining the concrete shall be backfilled, graded, and compacted to conform to the surrounding area in accordance with lines and grades indicated.

G. Protection: Completed concrete shall be protected from damage until accepted. The Contractor shall repair damaged concrete and clean concrete discolored during construction. Concrete that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints.

1. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

3.11 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface.

Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.12 FIELD QUALITY CONTROL

A. The Contractor will employ a testing laboratory to perform tests, inspect formwork and reinforcement placement and to submit test reports.

B. Sampling and testing for quality control during placement of concrete is to include, but not be limited to, the following.

C. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.

1. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.

2. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.

D. Compression Test Specimen: ASTM C 31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.

E. Test results will be reported in writing to Architect, Structural Engineer and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.

F. Nondestructive Testing: Impact hammer, sonoscope or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

G. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests when unacceptable concrete is verified.

H. Thickness Evaluation: The anticipated thickness of the concrete shall be determined prior to placement by passing a template through the formed section or by measuring the depth of opening of the extrusion template of the curb forming machine. If a slip form paver is used for sidewalk placement, the subgrade shall be true to grade prior to concrete placement and the thickness will be determined by measuring each edge of the completed slab.

I. Surface Evaluation: The finished surface of each category of the completed work shall be uniform in color and free of blemishes and form or tool marks.

3.13 SURFACE DEFICIENCIES AND CORRECTIONS

A. Thickness Deficiency: When measurements indicate that the completed concrete section is deficient in thickness by more than 1/4 inch the deficient section will be removed, between regularly scheduled joints, and replaced.

B. High Areas: In areas not meeting surface smoothness and plan grade requirements, high areas shall be reduced either by rubbing the freshly finished concrete with carborundum brick and water when the concrete is less than 36 hours old or by grinding the hardened concrete with an approved surface grinding machine after the concrete is 36 hours old or more. The area corrected by grinding the surface of the hardened concrete shall not exceed 5 percent of the area of any integral slab, and the depth of grinding shall not exceed ¼ inch. Pavement areas requiring grade or surface smoothness corrections in excess of the limits specified above shall be removed and replaced.

C. Appearance: Exposed surfaces of the finished work will be inspected by the Engineer and any deficiencies in appearance will be identified. Areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work shall be removed and replaced.

END OF SECTION 03300

SECTION 04720 – CAST STONE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, and Division 1 Specifications, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Cast stone cap at wall.
   2. Mortar and grout.
   3. Miscellaneous masonry accessories.

B. Related Sections:
   1. Section 04810 “Unit Masonry Assemblies”

1.3 SUBMITTALS

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

B. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.

   1. Include building elevations showing layout of units and locations of joints and anchors.

C. Samples for Verification: For color and texture of cast stone, 10 inches square in size.

D. Material Certificates: For each type and size of product indicated.

E. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

   1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
   2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.4 INFORMATIONAL SUBMITTALS

A. Material Test Reports: For each mix required to produce cast stone, based on testing according to ASTM C1364, including test for resistance to freezing and thawing.
   1. Provide test reports based on testing within previous two years.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units, and is plant certified by the Cast Stone Institute.

B. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

C. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery of cast stone with unit masonry work to avoid delaying the Work.

B. Pack, handle, and ship cast stone units in suitable packs or pallets.
   1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.
   2. Stone cast stone units on wood skids on pallets with nonstaining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

1.7 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 CAST STONE UNITS

A. Manufacturers: subject to compliance with requirements, provide products by the following or approved equal:
   1. U.S.Stone Architectural Cast Stone, 112 Wales Avenue, Jersey City, NJ

B. Provide cast stone units complying with ASTM C 1364 using the vibrant dry tamp or wet-cast method.

1. Provide units that are resistant to freezing and thawing.
2. Slope exposed horizontal surfaces 1/2:12, unless otherwise indicated.
3. Provide drips on projecting elements, unless otherwise indicated.

C. Cure units by one of the following methods:

1. Cure units with steam in enclosed curing room at temperature of 105 deg F (41 deg C) or above and 95 to 100 percent relative humidity for 6 hours.
2. Cure units with dense fog and water spray in enclosed warm curing room at 95 to 100 percent relative humidity for 24 hours.
3. Cure units to comply with one of the following:

   a. Not less than 5 days at mean daily temperature of 70 deg F (21 deg C) or above.
   b. Not less than 6 days at mean daily temperature of 60 deg F (16 deg C) or above.
   c. Not less than 7 days at mean daily temperature of 50 deg F (10 deg C) or above.
   d. Not less than 8 days at mean daily temperature of 45 deg F (7 deg C) or above.

D. Acid etch units after curing to remove cement film from surfaces to be exposed to view.

E. Colors and Textures: As selected by Architect from manufacturer's full range to match existing brownstone on house. Color with texture sample to be approved by Architect prior to fabrication.

F. Anchors
1. Stainless Steel Dowels, 6” long, ½” diameter, grouted in place.

2.2 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Aggregate for Mortar: ASTM C 144.

1. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
2. White-Mortar Aggregates: Natural white sand or crushed white stone.

D. Aggregate for Grout: ASTM C 404.

E. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

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

   a. Euclid Chemical Company (The); Accelguard 80.
   b. Grace Construction Products, W. R. Grace & Co. - Conn.; Morset.
   c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.

F. Water: Potable.

2.3 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

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

a. Diedrich Technologies, Inc.
b. EaCo Chem, Inc.
c. ProSoCo, Inc.

2.4 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
1. Limit cementitious materials in mortar to portland cement, mortar cement, and lime.
2. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type S.
2. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.

D. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2. Provide grout with a slump of 8 to 11 inches (203 to 279 mm) as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

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

3.2 INSTALLATION, GENERAL

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

B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).

2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.4 SETTING CAST STONE IN MORTAR

A. Set stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Allow cleaned surfaces to dry before setting.
3. Wet joint surfaces thoroughly before applying mortar.

B. Build concealed flashing into mortar joints as units are set.

3.5 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Protect surfaces from contact with cleaner.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
4. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

END OF SECTION 04720

SECTION 04810 - UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:

1. Alternate "A": Concrete masonry units for shed foundation wall.
2. Face brick.
3. Mortar and grout.
4. Steel reinforcing bars.
5. Masonry joint reinforcement.
6. Ties and anchors.
7. Miscellaneous masonry accessories.

B. Related Sections:

1. Division 2 Section 02780 "Unit Paving" for exterior unit masonry paving.

1.3 SUBMITTALS

A. Product Data & Samples:
1. For each masonry unit, accessory, and other manufactured product indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.5 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1.6 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of 2'x2' area of face brick in finished, noted pattern.

E. All block work shall be in accordance with IBC 2009 w/ NJ Modification and other applicable codes.

F. Field Measurements: The contractor and/or fabricator shall be responsible for all field measurements and the dimensions on the shop drawings fully defining the conditions for the installation of all masonry.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.

2.2 CONCRETE MASONRY UNITS

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Concrete Masonry Units: ASTM C 90, Grade N-I, hollow load bearing units.

1. Unit Compressive Strength: 1900-psi minimum, average compressive strength.
2. Weight Classification: Lightweight or Medium weight.
3. Type: I, moisture-controlled units.
4. Special Shapes: Provide for corners, bonding, and other special conditions.

C. Concrete Building Brick: ASTM C 55.
1. Weight Classification: Lightweight or Medium weight.
2. Type: I, moisture-controlled units.

2.3 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.

B. Face Brick: Facing brick complying with ASTM C 216.

1. Grade: MW or SW.
2. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67.
3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
4. Size (Actual Dimensions): 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.
5. Application: Use where brick is exposed unless otherwise indicated.

6. Color and Texture: Match Architect's samples.

2.4 MORTAR AND GROUT MIXES

A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.

B. Colored Mortar: Produce mortar of color required by using selected ingredients. Do not alter specified proportions without Architect's approval.

1. Mortar Pigments: Where mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.

C. Do not use admixtures of any kind in mortar, unless otherwise indicated.

D. Mortar Proportions: Mix mortar materials in the following proportions:

1. Type B: Pointing Mortar for Brick Masonry: 1 part portland cement, 1 part lime, and 6 parts sand
   a. Color and texture to be approved by architect for Brick Masonry

2. Type C: Setting Mortar: : 1 part portland cement, 1 part lime, and 3 parts sand

E. Portland Cement: ASTM C 150, Type I or Type II.

1. Provide white cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.

F. Hydrated Lime: ASTM C 207, Type S.

G. Mortar Sand: ASTM C 144, unless otherwise indicated.
1. Color & Texture – Match Architects Samples. Provide natural sand of color necessary to produce required mortar color.
2. For pointing mortar, provide sand with rounded edges.

H. Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.

I. Water: Potable.

2.5 STEEL REINFORCING BARS

A. Refer to architects drawings.

2.6 MASONRY JOINT REINFORCEMENT

A. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

B. Truss-Mesh – HB # 120, Hot-Dip Galvanized, Standard weight for 8” block

2.7 TIES AND ANCHORS

A. Corrugated Buck Anchor – HB # 345, Hot-Dip Galvanized after fabrication, 14 gauge, 1-1/4” x 3-1/2”

2.8 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Pre-molded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from urethane.

B. Preformed Control-Joint Gaskets: Made from PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Weep/Vent Products:

1. 1” PVC Pipe Weep
2. Rectangular Plastic Weep/Vent Tubing: Clear butyrate, 3/8 by 1-1/2 by 3-1/2 inches (9 by 38 by 89 mm) long.\

D. Termite Shield: Basis-of-Design Product, H&B Copper Termite Shield of 8” width. Or similar product of soft-tempered copper that is permanently coated on one side with a polyethylene membrane.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that foundations are within tolerances specified.
2. Verify that reinforcing dowels are properly placed.

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

3.2 INSTALLATION, GENERAL

A. Cut masonry units with motor-driven saws. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

B. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:

C. Lines and Levels:

1. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
2. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.

D. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).

3.3 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Lay exposed masonry in bond pattern indicated; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

1. Where no bond pattern is indicated, lay masonry in running bond.

C. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

D. Fill cores in hollow concrete masonry units with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

A. Lay hollow masonry units as follows:

1. With full mortar coverage on horizontal and vertical face shells.
2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.

B. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.

D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

E. Cut joints flush for masonry walls to receive direct-applied finishes (other than paint) unless otherwise indicated.

3.5 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).

1. Space reinforcement not more than 16 inches (406 mm) o.c.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at corners and wall intersections by using prefabricated L-shaped & T-shaped units.

D. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.6 WEEP HOLES

A. General: Install embedded flashing and weep holes in masonry and other obstructions to downward flow of water in wall, and where indicated.

B. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products to form weep holes.
2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.
4. Space weep holes formed from plastic tubing 16 inches (400 mm) o.c.
5. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.
6. Trim wicking material flush with outside face of wall after mortar has set.

3.7 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.

2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches (1520 mm)

3.8 CLEANING

A. Clean unit masonry by dry brushing to remove mortar fins and smears before tooling joints, as work progresses.

B. After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Protect adjacent surfaces from contact with cleaner.
3. Wet wall surfaces with water before brushing; rinsing the surfaces thoroughly with clear water after brushing.
4. Clean brick by the bucket-and-brush hand-cleaning method using only water.

3.9 MASONRY WASTE DISPOSAL

A. Masonry Waste Disposal: Remove masonry waste, and legally dispose of off Owner's property.

B. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

END OF SECTION 04810

SECTION 04850 – DIMENSIONED STONE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes dimension bluestone stair treads.

1.3 SUBMITTALS

A. Product Data: For each variety of stone, stone accessories, and other manufactured products indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.

C. Samples:

1. For each stone type.
2. For each color of grout required.

D. Maintenance data.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An installer who employs experienced mechanics and stone fitters who are skilled in installing stone paving and flooring similar in material, design, and extent to those indicated for this Project and whose projects have a record of successful in-service performance.

B. Field measurements

1. The Contractor and/or fabricator shall be responsible for all field measurements and the dimensions on the shop drawings fully defining the conditions for the installation of all stone.

1.5 PROJECT CONDITIONS

A. Cold-Weather Requirements for Stone work:

1. Do not build on frozen subgrade or setting beds.

2. Protect stone against freezing when atmospheric temperature is 40 deg F (4 deg C) and falling. Heat materials to provide mortar and grout temperatures between 40 and 120 deg F (4 and 49 deg C).
3. Provide the following protection for completed portions of work for 24 hours after installation when mean daily air temperature is as indicated:

    a. Below 40 deg F (4 deg C), cover with weather-resistant membrane.
    b. Below 25 deg F (minus 4 deg C), cover with insulating blankets.
    c. Below 20 deg F (minus 7 deg C), provide enclosure and temporary heat to maintain temperature above 32 deg F (0 deg C).

B. Hot-Weather Requirements for Stone: Protect stone when temperature and humidity conditions produce excessive evaporation of setting beds and grout. Provide artificial shade and windbreaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and above.

C. Site Storage: Upon receipt of stone at the job site, stone shall be stacked on timber or platforms at least 3 inches above the ground, and extreme care shall be taken to prevent staining during storage.

PART 2 - PRODUCTS

2.1 STONE, GENERAL

A. Varieties and Sources: Subject to compliance with requirements, provide one of the stone varieties specified for each stone type in Part 2 "Stone Types" Article.

B. Match existing stone for variety, color, and finish where stone is indicated to match existing.

C. Provide stone that is free of cracks, seams, and starts impairing structural integrity or function.

D. Provide stone from a single quarry for each variety of stone required.

E. Quarry stone in a manner to ensure that as-quarried block orientations yield finished stone with required characteristics.

2.2 STONE TYPES

A. Bluestone: Provide bluestone with a fine, even grain from clear, sound stock:

1. Color: Gray, Blue-gray.

2. Finish: Natural cleft, with no ridges in cleft surface exceeding 1/8”. Any irregularities determined by Architect to constitute a tripping hazard must be corrected by tooling surface or replacing stone.

2.3 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or II. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Aggregate: ASTM C 144 and as follows:

1. For pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
2. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.

D. Mortar Pigments: Natural or synthetic iron oxides, compounded for use in mortar mixes and with a record of satisfactory performance in stone mortars.

1. Available Manufacturers:

a. Bayer Corporation; Industrial Chemicals Div.
b. Davis Colors.
c. Solomon Colors.

E. Water: Potable.

2.4 ACCESSORIES

A. Cleaner: Stone cleaner specifically formulated for stone types, finishes, and applications indicated, as recommended by stone supplier. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

2.5 STONE FABRICATION

A. General: Fabricate stone in sizes and shapes necessary to comply with requirements indicated, including details on Drawings and Shop Drawings.

2.6 MORTAR MIXES

A. Mortar: Comply with referenced standards and with manufacturers' written instructions to produce mortar of uniform quality and with optimum performance characteristics.

1. Do not use admixtures, unless otherwise indicated. Do not use calcium chloride.
2. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding any water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

B. Portland Cement-Lime Setting Mortar for all new stone joints: 1:1:6 mixture of Type I or Type 2 Portland Cement, Type S hydrated lime, pigment and sand

C. Pointing Mortar: Provide pointing mortar complying with requirements indicated above for setting mortar, including type. Final color must consistently match approved mock-up.

1. Pigmented Pointing Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1:10, by weight.

PART 3 - EXECUTION

3.1 PREPARATION

A. Vacuum clean substrates to remove dirt, dust, debris, and loose particles.

B. Remove substances from substrates that could impair mortar bond.

C. Clean dirty or stained stone surfaces by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds.

3.2 INSTALLATION, GENERAL

A. Do necessary field cutting as stone is set. Use power saws with diamond blades to cut stone. Cut lines straight and true, with edges eased slightly to prevent snipping. Touch-up stone finish by hand-tooling, as necessary to match finish.

B. Set stone to comply with Drawings and Shop Drawings.

C. Scribe and field-cut stone as necessary to fit at obstructions. Produce tight and neat joints.

3.3 INSTALLATION TOLERANCES

A. Variation in Surface Plane: Do not exceed 1/4 inch in 10 feet, or 1/2 inch (10 mm) maximum from level or slope indicated.

B. Variation in Plane between Adjacent Units (Lipping): Do not exceed 1/16-inch difference between planes of adjacent units. Greater differences in plane must be approved by the Architect.

3.4 INSTALLATION OF STONE DIRECTLY OVER STONE OR CONCRETE

A. Saturate stone or concrete with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.

B. Apply mortar bed bond coat to damp stone or concrete and broom to provide an even coating that completely covers the concrete. Do not exceed 1/16-inch (1.5-mm) thickness. Limit area of mortar bed bond coat to avoid its drying out before placing setting bed.

C. Apply mortar bed immediately after applying mortar-bed bond coat. Spread, tamp, and screed to uniform thickness at elevations required for setting stone to finished elevations indicated.

D. Mix and place only that amount of mortar bed that can be covered with stone before initial set. Cut back, bevel edge, and discard material that has reached initial set before stone can be placed.

E. Place stone before initial set of mortar occurs. Immediately before placing stone on setting bed, apply uniform 1/16-inch- (1.5-mm-) thick bond coat to bed or to back of each stone unit.

F. Tamp and beat stone to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each unit in a single operation before initial set of mortar.

G. Rake out joints to depth required to receive pointing mortar as units are set.

3.5 CLEANING AND PROTECTION

A. Clean stone after setting and grouting are complete. Use procedures recommended by stone fabricator for types of application.

B. Prohibit traffic from installed stone for a minimum of 72 hours.

C. Protect stone during construction. Where adjoining areas require construction work access, cover stone paving and flooring with a minimum of 3/4-inch (20-mm) untreated plywood over nonstaining kraft paper.

END OF SECTION 04850

SECTION 05521 – METAL PIPE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Stainless steel pipe and tube handrails and railings.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding allowable design working stresses of materials for handrails, railings, anchors, and connections:

   1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:

      a. Concentrated load of 200 lbf (890 N) applied at any point and in any direction.
      b. Uniform load of 50 lbf/ft. (730 N/m) applied horizontally and concurrently with uniform load of 100 lbf/ft. (1460 N/m) applied vertically downward.
      c. Concentrated and uniform loads above need not be assumed to act concurrently.

   2. Handrails Not Serving As Top Rails: Capable of withstanding the following loads applied as indicated:

      a. Concentrated load of 200 lbf (890 N) applied at any point and in any direction.
      b. Uniform load of 50 lbf/ft. (730 N/m) applied in any direction.
      c. Concentrated and uniform loads above need not be assumed to act concurrently.

B. Thermal Movements: Provide handrails and railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

   1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 SUBMITTALS

A. Product Data: For the following:

B. Shop Drawings: Show fabrication and installation of handrails and railings. Include plans, elevations, sections, component details, and attachments to other Work.

C. Samples: For each type of exposed finish required, prepared on components indicated below and of same thickness and metal indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

1. 6-inch- (150-mm-) long sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
2. Fittings and brackets.

1.5 STORAGE

A. Store handrails and railings in a dry, well-ventilated, weathertight place.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 COORDINATION

A. Coordinate installation of anchorages for handrails and railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.8 SCHEDULING

A. Schedule installation so handrails and railings are mounted only on completed walls. Do not support temporarily by any means that does not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Stainless Steel Pipe and Tube Railings:

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

a. R & B Wagner, Inc.
b. Julius Blum & Co., Inc.
c. J.G. Braun Company

2. Basis-of-Design Product: Subject to compliance with requirements, provide pipe railing or comparable product by one of the following:

   a. R & B Wagner, Inc.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.3 STAINLESS STEEL

A. Tubing: ASTM A 554, Grade MT 316L.

B. Pipe: ASTM A 312/A 312M, Grade TP 316L.

C. Plate and Sheet: ASTM A 240/A 240M or ASTM A 666, Type 316L.

2.4 WELDING MATERIALS, FASTENERS, AND ANCHORS

A. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Fasteners for Anchoring Handrails and Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails and railings to other types of construction indicated and capable of withstanding design loads.

C. Fasteners for Interconnecting Handrail and Railing Components: Use fasteners fabricated from same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.

   1. Provide concealed fasteners for interconnecting handrail and railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for handrails and railings indicated.

D. Cast-in-Place and Postinstalled Anchors: Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

   1. Cast-in-place anchors.

2.5 GROUT AND ANCHORING CEMENT

A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for exterior applications.

2.6 FABRICATION

A. General: Fabricate handrails and railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble handrails and railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

D. Welded Connections: Fabricate handrails and railings for connecting members by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose. Weld connections continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

E. Nonwelded Connections: Fabricate handrails and railings by connecting members with concealed mechanical fasteners and fittings, unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

F. For railing posts set in concrete, provide preset sleeves of steel not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (12 mm) greater than outside dimensions of post, and steel plate forming bottom closure.

G. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.

H. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.

I. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.

J. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.

K. Fabricate joints that will be exposed to weather in a watertight manner.

L. Close exposed ends of handrail and railing members with prefabricated end fittings.

M. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4 inch (6 mm) or less.

2.7 STAINLESS-STEEL FINISHES

A. Remove tool and die marks and stretch lines, or blend into finish.

B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

C. Finish: Satin.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required to install handrails and railings. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.

1. Do not weld, cut, or abrade surfaces of handrail and railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
3. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).

C. Adjust handrails and railings before anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.

3.2 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.3 ANCHORING POSTS

A. At concrete: Form or core-drill holes not less than 5 inches (125 mm) deep and 3/4 inch (20 mm) larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's written instructions:
   1. Nonshrink, nonmetallic grout or anchoring cement.
   2. Fill top 1/2" depth with sealant, and leave 1/8-inch (3-mm) build-up, sloped away from post.

B. At stone: Core-drill holes not less than 5 inches (125 mm) deep and 3/4 inch (20 mm) larger than OD of post for installing posts in stone. Clean holes of loose material, insert posts, and fill annular space between post and stone with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's written instructions:
   1. Nonshrink, nonmetallic grout or anchoring cement.
   2. Fill top 1/2" depth with sealant, and leave 1/8-inch (3-mm) build-up, sloped away from post.

3.4 CLEANING AND ADJUSTING

A. Clean stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

3.5 PROTECTION

A. Protect finishes of handrails and railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05521

SECTION 05730 - DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Steel and iron ornamental fences and gates as indicated on the drawings.

2. New egress gate and hardware at sidewalk.

1.2 PERFORMANCE REQUIREMENTS

A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
1. Steel: 72 percent of minimum yield strength.

B. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Fences & Gates:

a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.3 SUBMITTALS

A. Product Data: For railings assembled from standard components, grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments.

1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
2. Fittings and brackets.
3. Welded connections.
4. Brazed connections.
5. Assembled Samples of railing systems, made from full-size components, including top rail, post, handrail, and infill. Show method of finishing members at intersections. Samples need not be full height.

D. Shop Drawings for the following
1. Vehicular Gate System: Indicating all components and coordination of all electrical and its requirements.
2. Pedestrian Gate
3. Egress Gate

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

B. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval.

C. Installer Qualifications: Arrange for installation of ornamental metal specified in this Section by the same firm that fabricated it.
1. Fabricator Qualifications: A firm experienced in producing ornamental metal similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
2. Available Fabricator: Subject to compliance with requirements, fabricators suitable to perform work of this section, but are not limited to, the following:
   a. Maza & Maza Welding
      28 Mulock Place
      East Newark, NJ 07029

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D11.2, "Structural Welding Code – Cast Iron."

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockups for each form and finish of railing consisting of two posts, top rail, infill area, and anchorage system components.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating railings without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.

1.6 COORDINATION AND SCHEDULING

A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Steel and Iron Ornamental Railing Elements: Basis-of-Design Products

   a. Basis-of-Design Products: King Architectural Metals, Baltimore, MD

2. Vehicle Gate Hardware: Basis-of-Design Products as listed

   a. Hinges and Steel Sheet: King Architectural Metals, Baltimore, MD
   b. Gate Operator: FAAC USA, Cheyenne, WY
   c. Intercom: The Chamberlain Group Inc., Elmhurst, IL

2.2 METALS

A. Brackets, Flanges, and Anchors: Same metal and finish as supported rails, unless otherwise indicated.

B. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

C. Steel and Iron:

1. Tubing: ASTM A 500 (cold formed) or ASTM A 513, Type 5 (mandrel drawn).
2. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
3. Plates, Shapes, and Bars: ASTM A 36/A 36M.
4. Castings: Either gray or malleable iron, unless otherwise indicated.

   a. Gray Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.
   b. Malleable Iron: ASTM A 47/A 47M.

D. Decorative Cast Iron: (Basis-of-Design Products)

1. Quad top spear for ¾” x ¾” solid picket: King Metal #10-6004-34
2. Post Ball Cap for 4” square tube: King Metal # 45-119
3. Post Ball Cap for 6” square tube: King Metal # 45-126-PB
4. Post Cap for 2” square tube: King Metal # 45-807

E. Pedestrian Gate Hardware: (Basis-of-Design Products)

1. Barrel Hinges with Stainless Steel Pin: King Metal #44-2003-E
2. Handle Kit: King Metal #13-09000-001
3. Cane Bolt: King Metal #21-QB124
4. Cane Bolt Sheath: King Metal #13-04015-397

F. Egress Gate Hardware: (Basis-of-Design Products)

1. Barrel Hinges with Stainless Steel Pin: King Metal #44-2003-E
2. Superior Exit Bar Kit: DAC Industries #6045-B36
3. Gate Latch Protector: DAC Industries #6015

G. Vehicle Gate Hardware: (Basis-of-Design Products)

NOTE: Contractor to provide a complete and operational gate package including all components, equipment, and accessories for a fully functioning vehicular gate.

1. Barrel Hinges with Stainless Steel Pin: King Metal #44-2003-E
2. Automatic Gate Lock: FAAC 1200lb magnetic lock with Z-bracket
3. Dual Swing Gate Operators: FAAC Model 400 EG (115 volt)
   a. Internal positive stops, FAAC Model 84, provide 2
4. Control Box: FAAC Model 455 control board in 14” x 16” x 5” steel enclosure

5. Intercom: See Section 16720 – Telephone Entry Systems
6. Intercom Interior Device: See Section 16720 – Telephone Entry Systems
7. Steel Sheet: King Metal #65-16G-4X8
8. One (1) preformed free exit safety loop (4' x 10') by BD Loops
9. Two (2) preformed safety loops (4' x 10') by BD Loops
10. Wall mounted Photocells: Albano Electronics Model IR55
11. Two (2) 24-volt loop detectors, Reno Model BXC (12 to 24 volt AC/DC)

NOTE: In addition to the items listed above, under "Vehicle Gate Hardware", the contractor shall be responsible for purchase and installation of any other items that support the proper installation of the aforementioned items and full functionality of the vehicle gate.

2.3 MISCELLANEOUS MATERIALS

A. Fasteners: Provide concealed fasteners, unless otherwise indicated.

1. Stainless-Steel Components: Type 304 stainless-steel fasteners.
2. Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
3. Dissimilar Metals: Type 316 stainless-steel fasteners.

B. Anchors: Provide cast-in-place or torque-controlled expansion anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488.

C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal primer complying with Benjamin Moore P04-01.

D. Grout and Anchoring Cement: Factory-packaged, nonshrink, nonmetallic grout complying with ASTM C 1107, or water-resistant, nonshrink, anchoring cement; recommended by manufacturer for exterior use.

E. Tension Cable System: Provide ¼" stainless steel tension cable with turnbuckles, capable of providing supplementary support for load of gate.

2.4 FABRICATION

A. General: Fabricate fencing to comply with design, dimensions, and details indicated.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Form work true to line and level with accurate angles and surfaces.

D. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.

E. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

F. Connections: Fabricate railings with welded connections unless otherwise indicated.

G. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.

H. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

1. Top rails and intermediate rails are to be punched for receipt of ¾” solid pickets.

I. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings.

J. Form curves by bending in jigs to produce uniform curvature; maintain cross section of member throughout bend without cracking or otherwise deforming exposed surfaces.

K. Close exposed ends of hollow railing members with prefabricated end fittings.

L. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.

M. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

N. Grind tops of short pickets round to 3/8” radius. Remove burrs and ease edges, and emove sharp or rough areas on exposed surfaces.

2.5 FINISHES

A. Steel and Iron:

1. Shop-Primed Steel Finish: Prepare surfaces to comply with SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning" and apply primer to comply with SSPC-PA 1.
2. All metalwork shall be painted black, as follows:
   a. Exterior Acrylic (Flat): P04-01.

2.6 GATES

A. Gates shall be fabricated using fence panel material and gate ends as detailed on drawings. All connections shall be joined by welding. Each picket and rail intersection shall also be joined by welding.

B. Completed gate sections shall be capable of supporting a 600 lb. load applied at Midspan without permanent deformation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation.

B. Anchoring Posts
   1. In wall: Build wall. Core drill through coping and backup brick to the top of concrete backup. Diameter of core to match outside diameter of galvanized steel sleeve, at 3 1/2” diameter. Cut steel sleeve at height or at length between top of concrete and top of coping. Grind top of steel sleeve to be flush with top of stone coping. Insert 2”x2” HM post into sleeve and fill annular space between post and sleeve with the following anchoring material, mixed and placed to comply with anchoring material manufacturer’s written instructions:
      a. Nonshrink, nonmetallic grout or anchoring cement.
      b. Fill top 1/2" depth with sealant, and leave 1/8-inch (3-mm) build-up, sloped away from post.

   2. In sidewalk (concrete): Form holes with space allowing ½” around width of post and 3’-6” deep. Place sonotube, sized to width of hole, into the hole. Position post in hole at 6” from bottom of hole. Clean holes of loose material, insert posts, and fill annular space between post and sonotube with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's written instructions:

      a. Nonshrink, nonmetallic grout or anchoring cement.
      b. Fill top 1/2" depth with sealant, and leave 1/8-inch (3-mm) build-up, sloped away from post.

Note: Sonotube to be cut to depth of hole from bottom of hole to underside of concrete sidewalk or paving surface.

3. Set posts plumb within a tolerance of 1/16 inch.
4. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).

C. Touchup Painting: Immediately after erection, clean abraded areas and paint exposed areas with same material as used for shop painting.

END OF SECTION 05730

SECTION 06100 - 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. Alternate "A": This Section is related to the construction of the new shed. This Section includes the following:

1. Framing with dimensional lumber.
2. Wood blocking, cants and nailers.
3. Plywood sheathing.
4. Solid wood and spaced sheathing.
5. Interior standing and running trim.

B. Related Sections include the following:

1. Division 6 Section 06401 "Exterior Architectural Woodwork"
3. Division 7 Section 07620 "Sheet Metal Flashing"

1.3 DEFINITIONS

A. Exposed Framing: Framing not concealed by other construction.

B. Dimension Lumber: Lumber of 2 inches nominal in least dimension.

C. Timber: Lumber of 2 inches actual or greater in least dimension.

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

B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

C. Qualifications:

1. Sub-contractor qualifications for all work in this Section per requirements in Section 1.5 B, Quality Assurance, below.

1.5 QUALITY ASSURANCE

A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.

B. Contractor Qualifications: The Van Wagenen / Apple Tree House is listed on the New Jersey Register of Historic Places. Work performed shall comply with the "Secretary of the Interior's Standards for the Treatment of Historic Properties". The contractor or subcontractor performing the work of this section shall demonstrate experience commensurate with this project.

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. 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. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
2. Kiln-dry lumber after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
3. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

B. Application: Treat items indicated on Drawings, and the following with Preservative Treatment by Pressure Process:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Nominal wood framing members including sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.
3. Nominal wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Nominal wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

C. Preservative Treatment by Waterborne Biocide: Treat all timber frame elements, such as wood sills, joists, posts and studs in direct contact with masonry with surface applied Bora-Care liquid concentrate and Impel Rods per manufacturer's written recommendations.

a. Bora-Care Termiticide, Insecticide and Fungicide Concentrate from Preservation Resource Group, Inc., PO Box 1768, Rockville MD 20849, 800-774-7891.
b. Or, approved equal.

2.3 ENGINEERED WOOD PRODUCTS

A. Engineered Wood Products, General: Products shall contain no urea formaldehyde.

B. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.

C. Laminated-Strand Lumber: (Includes 3-1/2”x11-1/4” Header) Structural composite lumber made from wood strand elements primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.

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

a. Weyerhaeuser Company.

2. Structural properties: Equivalent to “iLevel Trus Joist” 1.3E Timberstrand LSL by Weyerhauser

D. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research/evaluation report for I-joists.

1. Manufacturer: Provide products by same manufacturer as I-joists.

E. Treated LSL sill plates: “iLevel Trus Joist” Strandguard Timberstrand LSL by Weyerhauser.

2.4 DIMENSION LUMBER FRAMING

A. Maximum Moisture Content: 15 percent.

B. Joists, Rafters, and Other Framing: No. 2 grade or better and the following species:
1. Douglas fir-larch; WCLIB or WWPA.

C. Studs: Construction grade or better and the following species:
1. Douglas fir: WCLIB or WWPA

D. Joists, Rafters, and Other Framing Not Listed Above: Any species of machine stress-rated dimension lumber with a grade of not less than 2100f-1.8E.

E. Joists, Rafters, and Other Framing Not Listed Above: Any species and grade with a modulus of elasticity of at least 1,100,000 psi (7590 MPa).

F. Exposed Exterior Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
   1. Species and Grade: Douglas fir-larch;No. 1 grade; WCLIB, or WWPA.

2.5 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

A. Quality Standard: Comply with AWI Section 300.

B. Grade: Premium.

C. Wood Species: Western red cedar or mahogany.

D. Finish: Match door or window finish.

2.6 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch (13-mm) nominal thickness.

2.7 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. Cants.
   4. Solid wood board, including roofing starter boards, and spaced sheathing

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 15 percent maximum moisture content and any of the following species:

   1. Hem-fir; WCLIB, or WWPA.
   2. Western woods; WCLIB or WWPA.

C. For exposed boards, provide lumber with 15 percent maximum moisture content and the following species and grades:

   1. Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Premium or 2 Common (Sterling) grade; NeLMA, NLGA, WCLIB, or WWPA.

D. For concealed boards, provide lumber with 15 percent maximum moisture content and the following species and grades:

   1. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

E. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

F. 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.

G. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.8 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.

2. All fasteners used in contact with Alkaline Copper Quaternary (ACQ) treated lumber are to be stainless steel.

B. Nails and Brads: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-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.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

2.9 METAL FRAMING ANCHORS

A. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawings or comparable products by one of the following:
   1. Simpson Strong-Tie Co., Inc.

B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

C. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

   1. Use for interior locations where stainless steel is not indicated.

D. Stainless-Steel Sheet: ASTM A 666, Type 304 .

   1. Use for exterior locations and where indicated.

E. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch (25 mm) above base and with 2-inch- (50-mm-) minimum side cover, socket 0.062 inch (1.6 mm) thick, and standoff and adjustment plates 0.108 inch (2.8 mm) thick.

F. Hurricane Tie: Simpson H3 (Basis-of-Design Product) or similar uplift tie @ 4’-0” o.c.

G. Gusset Plate: 3”x8” at connecting braces to roof joists.

2.10 MISCELLANEOUS MATERIALS

A. Adhesives for Gluing Framing to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

   1. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

C. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. CABO NER-272 for power-driven fasteners.
2. Published requirements of metal framing anchor manufacturer.
3. Table 2305.2, "Fastening Schedule," in the BOCA National Building Code.

E. Do not splice structural members between supports, unless otherwise indicated.

F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

G. 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.

H. 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.

I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. CABO NER-272 for power-driven fasteners.
2. Published requirements of metal framing anchor manufacturer.
3. Table 2305.2, "Fastening Schedule," in the BOCA National Building Code.

J. Use common wire 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; do not countersink nail heads, unless otherwise indicated.

K. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

1. Comply with approved fastener patterns where applicable.
2. Use finishing nails, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

3.2 WOOD GROUND, BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required forattaching 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.

C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

D. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WALL AND PARTITION FRAMING INSTALLATION

A. General: Provide double bottom plate, as indicated, and double top plates using members of 2-inch nominal (38-mm actual) thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions and for load-bearing partitions where framing members bearing on partition are located directly over studs. Fasten plates to supporting construction unless otherwise indicated.

1. For exterior walls, provide 2-by-6-inch nominal- (38-by-140-mm actual-) size wood studs spaced 16 inches (406 mm) o.c. unless otherwise indicated.
2. Provide continuous horizontal blocking at midheight of partitions more than 96 inches (2438 mm) high, using members of 2-inch nominal (38-mm actual) thickness and of same width as wall or partitions.

B. Construct corners and intersections as indicated in drawings.

C. Frame openings as indicated in drawings.

3.4 CEILING JOIST AND RAFTER FRAMING INSTALLATION

A. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.

1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal- (19-by-184-mm actual-) size or 2-by-4-inch nominal- (38-by-89-mm actual-) size stringers spaced 48 inches (1200 mm) o.c. crosswise over main ceiling joists.

B. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.

C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal- (19-by-140-mm actual-) size boards between every third pair of rafters, but not more than 48 inches (1219 mm) o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.

D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

3.5 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 rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06100

SECTION 06401 - EXTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Alternate "A": This Section is related to the construction of the new shed. This Section includes the following:

1. Exterior standing and running trim.
2. All cornice, rake and return millwork.
3. Exterior frames, jambs sills and casings.
4. Wood siding.
5. Shop priming exterior woodwork.

B. Related Sections include the following:
1. Division 6 Section 06100 "Carpentry" for framing repair, blocking and built-in gutter framing.
2. Division 9 Section 09900 "Exterior Painting" for finishing exterior architectural woodwork.

1.3 SUBMITTALS

A. Product Data: For each type of product and process indicated and incorporated into items of exterior architectural woodwork during fabrication, finishing, and installation.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Samples for Verification:
1. Lumber and panel products for shop-applied opaque finish, 8 by 10 inches (200 by 250 mm) for panels and 50 sq. in. (300 sq. cm) for lumber, for each finish system and color, with 1/2 of exposed surface finished.
2. Exterior woodwork samples 12-inches long for every type of exterior architectural woodwork to be replaced.

C. Product Certificates: For each type of product, signed by product manufacturer.

1.4 QUALITY ASSURANCE

A. Contractor Qualifications: The Van Wagenen / Apple Tree House is listed on the New Jersey Register of Historic Places. Work performed shall comply with the “Secretary of the Interior’s Standards for the Treatment of Historic Properties”. The contractor or subcontractor performing the work of this section shall demonstrate experience commensurate with this project.

B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of exterior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1.5 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation of exterior woodwork only when existing and forecasted weather conditions permit work to be performed and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

C. Prior to installation of exterior woodwork, the Architect shall be notified of all field conditions that prevent new construction from fitting with existing conditions and providing appropriate contact and anchoring.

1.6 COORDINATION

A. Coordinate sizes and locations of framing, blocking, reinforcements, and other related units of Work specified in other Sections to ensure that exterior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

2.2 INSTALLATION MATERIALS

A. Blocking, Shims, and Nailers: Softwood or hardwood lumber, pressure-preservative treated kiln dried to less than 15 percent moisture content.

B. Nails: Stainless steel, type 304.

C. Screws: Stainless steel, type 304.

1. Provide self-drilling screws for metal framing supports, as recommended by metal-framing manufacturer.

D. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts, unless otherwise indicated. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.3 FABRICATION, GENERAL

A. Wood Moisture Content: 8 to 12 percent.

B. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Edges of Solid-Wood (Lumber) Members 3/4 Inch (19 mm) Thick or Less: 1/16 inch (1.6 mm).
2. Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick: 1/8 inch (3 mm).

C. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

D. Shop cut openings, to maximum extent possible, to receive hardware, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts and seal with a water-resistant coating suitable for exterior applications.

2.4 EXTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

A. Grade: Premium.

B. Backout or groove backs of flat trim members, and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

C. Assemble casings in plant except where shipping limitations require field assembly.

D. Wood Species: Western red cedar or mahogany.

1. Do not use plain-sawn lumber with exposed, flat surfaces more than 3 inches (75 mm) wide.

E. Do not use plain-sawn lumber with exposed, flat surfaces more than 3 inches (75 mm) wide.

2.5 EXTERIOR FRAMES AND JAMBS FOR OPAQUE FINISH

A. Grade: Premium.

B. Wood Species: Western red cedar or mahogany.

1. Do not use plain-sawn lumber with exposed, flat surfaces more than 3 inches (75 mm) wide.

2.6 WOOD SIDING FOR OPAQUE FINISH

A. Grade: Premium.

B. Wood Species: Western red cedar or mahogany.

1. Do not use plain-sawn lumber with exposed, flat surfaces more than 3 inches (75 mm) wide.

2.7 EXTERIOR ORNAMENTAL WORK FOR OPAQUE FINISH

A. Exterior ornamental work for opaque finish includes the following:
1. Cornices.
2. Fascia boards.
3. Frieze boards.
4. Soffit

B. Grade: Premium.

C. Wood Species: Western red cedar or mahogany.

1. Do not use plain-sawn lumber with exposed, flat surfaces more than 3 inches (75 mm) wide.

2.8 SHOP PRIMING

A. Woodwork for Opaque Finish: Shop prime woodwork for paint finish with one coat of wood primer specified in Division 9 painting Sections.

C. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.

1. Backpriming: Apply one coat primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Deliver concrete inserts and similar anchoring devices to be built into substrates well in advance of time substrates are to be built. Verify adequacy of backing and support framing.

C. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

D. Verify adequacy of backing and support framing.

3.2 INSTALLATION

A. Quality Standard: Install woodwork to comply with same grade specified in Part 2 for type of woodwork involved.

B. Install woodwork true and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk concealed fasteners and blind nailing. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork.

E. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 60 inches (900 mm) long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.

1. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches (3 mm in 2400 mm).

F. All window and door jambs, casings, stops and sills to be full length pieces.

G. Scarf joints: glue and nail scarf joints through joint into substrate.

H. Complete finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail and screw holes with exterior grade wood filler, sand smooth and spot-prime prior to finishing.

I. Refer to Division 9 Sections for final finishing of installed architectural woodwork.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; replace woodwork where not possible to repair. Adjust joinery for uniform appearance.

B. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06401

SECTION 07610 - SHEET METAL ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Alternate "A": Section includes custom-fabricated, terne coated steel (TCS) standing-seam sheet metal roofing at new shed.
   1. Note: Lead coated copper (LCC) is alternate option if TCS is not available at time of construction.

B. Related Requirements:
   1. Division 7 Section 07620 "Sheet Metal Flashing" for gutters, downspouts, fasciae, copings, and flashings that are not part of sheet metal roofing.
   2. Division 7 Section 07920 "Joint Sealants" for field-applied sealants adjoining sheet metal roofing.

1.3 COORDINATION

A. Coordinate sheet metal roofing layout and seams with sizes and locations of roof curbs, equipment supports, equipment provided, and roof penetrations.

B. Coordinate sheet metal roofing installation with rain drainage work, flashing, trim, and construction of roofing substrate, and other adjoining work to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project Site.
   1. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affect sheet metal roofing.
   2. Review roof observation and repair procedures after sheet metal roofing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: For sheet metal roofing.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion joint locations, fixed points, and keyed details. Distinguish between shop- and field-assembled work.
3. Include details of connections to adjoining work.
4. Detail the following accessory items, at scale of not less than 6 inches per 12 inches (1:2).

   a. Flashing and trim.
   b. Gutters and downspouts as they relate to adjacent sheet metal roofing.

C. Samples: For each type of exposed finish.

1. Sheet Metal Roofing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, and other attachments.
2. Other Accessories: 12-inch- (300-mm-) long Samples for each type of other accessory.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer & Fabricator.

1.7 QUALITY ASSURANCE

A. Sheet Metal Roofing Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal roofing similar to that required for this Project and whose products have a record of successful in-service performance.

B. Mockups: Build mockups to verify selections made under Sample submittals to demonstrate aesthetic effects and to set quality standards for fabrication and installation.

1. Build mockup of typical roof area and eave as shown on Drawings, including, underlayment, attachments, and accessories.

   a. Size: From eave to ridge, min 3 pans wide.
   b. Include each type of exposed seam and seam termination, fascia, soffit, ridge, gable end, and rake.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal roofing materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal roofing materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal roofing from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal roofing installation.

1.9 WARRANTY

A. Special Warranty: Warranty form at end of this Section in which Installer agrees to repair or replace components of sheet metal roofing that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, rupturing, cracking, or puncturing.
b. Wrinkling or buckling.
c. Loose parts.
d. Failure to remain weathertight, including uncontrolled water leakage.
e. Deterioration of metals, metal finishes, and other materials beyond normal weathering, including nonuniformity of color or finish.
f. Galvanic action between sheet metal roofing and dissimilar materials.

2. Warranty Period: Ten years from date of Substantial Completion.

B. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Sheet metal roofing system including, but not limited to, metal roof panels, cleats, anchors and fasteners, sheet metal flashing integral with sheet metal roofing, fascia panels, trim, underlayment, and accessories, shall comply with requirements without failure due to defective manufacture, fabrication, or installation, or due to other defects in construction. Sheet metal roofing shall remain watertight.

B. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or indicated on Drawings.

C. Copper Roofing Standard: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 ROOFING SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Zinc-Tin Alloy-Coated Stainless Steel Sheet: ASTM A 240/A 240M, Type 304, dead-soft, fully annealed, stainless-steel sheet, coated on both sides with zinc-tin alloy (50 percent zinc, 50 percent tin); with factory-applied gray preweathering.

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

a. Follansbee Steel; TCS II (Basis-of-Design Product)

2. Thickness and Weight at Standing Seam Sloped Roof: 0.015-inch- (0.4-mm-) thick sheet including coating, unless otherwise indicated.

C. Lead-Coated Copper Sheet: ASTM B 101, Type I, Class A, consisting of cold-rolled copper sheet of weight indicated below, coated both sides with lead weighing not less than 12lb/100 sq. ft. nor more than 15 lb/100 sq. ft. of copper sheet (total weight of lead applied to both sides).

1. Weight for roofing sheets, downspouts, and conductor heads: Not less than 17.1 oz./sq. ft. with nominal weight of bare copper sheet 16 oz./sq. ft., unless otherwise indicated.
2. Weight for flashing, exposed trim, and gravel stops: Not less than 20 oz/sq. ft. nominal weight bare copper sheet, unless otherwise indicated.

2.3 UNDERLAYMENT MATERIALS

A. Felts: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felts.

B. Ice & Water Underlayment: Polyethylene-sheet-backed rubberized asphalt membrane, 40 mils (1.0 mm) thick. Provide primer when recommended by manufacturer.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

   Grace Ice & Water Shield, W.R. Grace & Co.

C. Paper Slip Sheet: 5-lb/square (0.244 kg/sq. m) red rosin, sized building paper conforming to FS UU-B-790, Type I, Style 1b.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete roofing system and as recommended by primary sheet metal manufacturer unless otherwise indicated.

B. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.

C. Solder:
1. For Zinc-Tin Alloy-Coated Stainless Steel: ASTM B 32, 100 percent tin, with maximum lead content of 0.2 percent, as recommended by sheet metal manufacturer.
2. For lead-coated copper: ASTM B 32, Grade Sn60, 60 % tin and 40% lead, used with rosin flux.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal roofing and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

H. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.

2.5 ACCESSORIES

A. Sheet Metal Accessories: Provide components required for complete sheet metal roofing assembly including trim, copings, fasciae, corner units, clips, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items. Match material and finish of sheet metal roofing unless otherwise indicated.

1. Cleats: Intermittent and continuous attachment devices for mechanically seaming into joints and formed from the following materials and thicknesses unless otherwise indicated:
   a. Zinc-Tin Alloy-Coated Stainless Steel Roofing: 16-oz./sq. ft. (0.55-mm) copper sheet.

2. Expansion-Type Cleats: Cleats of a design that allows longitudinal movement of roof panels without stressing panel seams; of same material as other cleats.
3. Backing Plates: Plates at roofing splices, fabricated from material recommended by SMACNA.
4. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible-closure strips; cut or premolded to match sheet metal roofing profile. Provide closure strips where necessary to ensure weathertight construction.
5. Flashing and Trim: Formed from same material and with same finish as sheet metal roofing, minimum 0.018 inch (0.46 mm) thick.

2.6 FABRICATION, GENERAL

A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.

B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.

D. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.

E. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

F. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

G. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.

1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

PART 3 - EXECUTION

3.1 EXAMINATION

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

1. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking, that tops of fasteners are flush with surface, and that installation is within flatness tolerances required for finished roofing installation.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored, and that provision has been made for drainage, flashings, and penetrations through sheet metal roofing.
3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating sheet metal roofing to verify actual locations of penetrations relative to seam locations of sheet metal roofing before installation.

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

3.2 PREPARATION

A. Lay out panel arrangement before installation of sheet metal roofing. Space as shown on drawings.

3.3 UNDERLAYMENT INSTALLATION

A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal roofing. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

1. Apply from eave to ridge.
2. Apply on roof not covered by self-adhering sheet underlayment.

B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller. Cover underlayment within 14 days.

1. Apply self-adhering sheet underlayment minimum 3’ from all roof edges and ridge.

C. Apply slip sheet, wrinkle free, over underlayment before installing sheet metal roofing and related flashing.

D. Install flashings to cover underlayment according to requirements in Section 076200 "Sheet Metal Flashing and Trim."

3.4 INSTALLATION, GENERAL

A. General: Install sheet metal roofing to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to installation characteristics required unless otherwise indicated on Drawings. Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required for complete roofing system and as recommended by fabricator for sheet metal roofing.

1. Install sheet metal roofing true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Anchor sheet metal roofing and other components of the Work securely in place, with provisions for thermal and structural movement.
3. Field cutting of sheet metal roofing by torch is not permitted.
4. Provide metal closures at peaks, rake edges, rake walls, eaves, and each side of ridge caps.
5. Flash and seal sheet metal roofing with closure strips at eaves, rakes, and perimeter of all openings. Fasten with self-tapping screws.
6. Locate and space fastenings in uniform vertical and horizontal alignment. Predrill panels for fasteners.
7. Install ridge caps as sheet metal roofing work proceeds.

8. Locate roofing splices over, but not attached to, structural supports. Stagger roofing splices and end laps to avoid four-panel lap splice condition. Install backing plates at roofing splices.
9. Lap metal flashing over sheet metal roofing to direct moisture to run over and off roofing.
10. Do not use graphite pencils to mark metal surfaces.

B. Thermal Movement: Rigidly fasten metal roof panels to structure at only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction.

1. Point of Fixity: Fasten each panel along single line of fixing located at eave, ridge, and rake.
2. Avoid attaching accessories through roof panels in manner that inhibits thermal movement.

C. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.

D. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended by sheet metal manufacturer or SMACNA.

1. Coat concealed side of copper sheet metal roofing with bituminous coating where roofing contacts wood, ferrous metal, or cementitious construction.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Fasciae: Align bottom of sheet metal roofing and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal sheet metal roofing with closure strips where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.5 CUSTOM-FABRICATED SHEET METAL ROOFING INSTALLATION

A. Fabricate and install work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves, and avoidable tool marks, considering metal temper and reflectivity. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant. Fold back sheet metal to form hem on concealed side of exposed edges unless otherwise indicated.

1. Install cleats to hold sheet metal panels in position. Attach each cleat with at least two fasteners to prevent rotation.
2. Space cleats not more than 12 inches (300 mm) o.c. Bend tabs over fastener head.

3. Provide expansion-type cleats for roof panels that exceed 30 feet (9.1 m) in length.

B. Seal joints as required for watertight construction. For roofing with 3:12 slopes or less, use cleats at transverse seams.

1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

C. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to a width of 1-1/2 inches (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not pre-tin zinc-tin alloy-coated copper.
2. Do not use torches for soldering.
3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
4. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.

D. Standing-Seam Roofing: Attach standing-seam metal panels to substrate with double-fastened cleats spaced at 12 inches (300 mm) o.c. Install panels reaching from eave to ridge before moving to adjacent panels. Before panels are interlocked, apply continuous bead of sealant to top of flange of lower panel. Lock standing seams by folding over twice so cleat and panel edges are completely engaged.

1. Lock each panel to panel below with soldered and sealed transverse seam.
2. Loose-lock panels at eave edges to continuous cleats and flanges at roof edge at gutters.
3. Loose-lock panels at eave edges to continuous edge flashing exposed 24 inches (600 mm) from roof edge. Attach edge flashing to face of roof edge with continuous cleat fastened to roof substrate at 12-inch (305-mm) o.c. spacing. Lock panels to edge flashing.
4. Fold over seams after locking at ridges and hips.

3.6 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for complete sheet metal roofing assembly including trim, copings, seam covers, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items.
2. Install accessories integral to sheet metal roofing that are specified in Section 07620 "Sheet Metal Flashing and Trim" to comply with that Section's requirements.

3.7 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal roofing within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.8 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal roofing is installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal roofing installation, clean finished surfaces as recommended by sheet metal roofing manufacturer. Maintain sheet metal roofing in clean condition during construction.

E. Replace sheet metal roofing components that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.9 ROOFING INSTALLER'S WARRANTY

A. WHEREAS <**Insert name**> of <**Insert address**>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: <**Insert name**>.
2. Owner's Address: <**Insert address**>.
3. Building Name/Type: <**Insert information**>.
4. Building's Address: <**Insert address**>.
5. Area of Work: <**Insert information**>.
6. Acceptance Date: <**Insert date**>.
7. Warranty Period: <**Insert time**>.
8. Expiration Date: <**Insert date**>.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

    a. Lightning;
    b. Peak gust wind speed exceeding <**Insert mph (m/sec)**>;
    c. Fire;
    d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
    f. Vapor condensation on bottom of roofing; and
    g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled

surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.

6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <**Insert day**> day of <**Insert month**>, <**Insert year**>.

1. Authorized Signature: <**Insert signature**>.
2. Name: <**Insert name**>.
3. Title: <**Insert title**>.

END OF SECTION 07610

SECTION 07620 - SHEET METAL FLASHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Alternate "A": This Section is related to the construction of the new shed. This Section includes terne coated steel (TCS) sheet metal flashing and trim.
   1. Note: Lead coated copper (LCC) is alternate option if TCS is not available at time of construction.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 7 Section 07610 "Sheet Metal Roofing"
   2. Division 7 Section 07920 "Joint Sealants"

1.3 PERFORMANCE REQUIREMENTS

A. General: Install metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data including manufacturer's material and finish data, installation instructions, maintenance data, and general recommendations for each specified material and fabricated product.

C. Samples of sheet metal flashing, trim, and accessory items, in the specified finish. Where finish involves normal color and texture variations, include Sample sets composed of 2 or more units showing the full range of variations expected.
   1. 8-inch- (200-mm-) square Samples of specified sheet materials to be exposed as finished surfaces.

D. Shop Drawings: Show details of sheet metal flashing and trim, including plans, elevations, expansion joint locations, and keyed details. Distinguish between shop- and field-assembled work.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Industry Standard: Unless otherwise directed, comply with the Sheet Metal and Air Conditioning Contractors National Association's (SMACNA) "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown.

C. Mock-ups: Before installing sheet metal roofing and trim elements, construct mock-ups for each form of construction to demonstrate aesthetic effects and qualities of materials and execution.

1. Notify Architect one week in advance of the dates and times when mockups will be constructed.

1.6 PROJECT CONDITIONS

A. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

1.7 MATERIALS DELIVERY, STORAGE AND HANDLING

A. Deliver sheet metal flashing components so as not to be damaged or deformed. Package sheet metal materials for protection during transportation and handling.

B. Unload, store and erect sheet metal materials in a manner to prevent bending, warping, twisting and surface damage.

C. Stack materials on platforms or pallets, covered with suitable weather tight and ventilated covering. Store sheet metal roofing materials to ensure dryness. Do not store materials in contact with other materials that might cause staining, denting, or other surface damage.

D. Materials stored at project site must be covered and sloped for moisture to drain from the surfaces. Materials must be vented to allow condensation to escape.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. Zinc-Tin Alloy-Coated Stainless Steel Sheet: ASTM A 240/A 240M, Type 304, dead-soft, fully annealed, stainless-steel sheet, coated on both sides with zinc-tin alloy (50 percent zinc, 50 percent tin); with factory-applied gray preweathering.

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

   a. Follansbee Steel; TCS II (Basis-of-Design Product)

2. Thickness and weight at gutters, downspouts, flashings: 0.018-inch- (0.5-mm-) thick sheet weighing approximately 0.77 lb/sq.ft. (3.76 kg/sq.m) including coating, unless otherwise indicated.

B. Lead-Coated Copper Sheet: ASTM B 101, Type I, Class A, consisting of cold-rolled copper sheet of weight indicated below, coated both sides with lead weighing not less than 12lb/100 sq. ft. nor more than 15 lb/100 sq. ft. of copper sheet (total weight of lead applied to both sides).

1. Weight for roofing sheets, downspouts, and conductor heads: Not less than 17.1 oz./sq. ft. with nominal weight of bare copper sheet 16 oz./sq. ft., unless otherwise indicated.
2. Weight for flashing, exposed trim, and gravel stops: Not less than 20 oz/sq. ft. nominal weight bare copper sheet, unless otherwise indicated.

2.2 MISCELLANEOUS MATERIALS

A. Solder:

1. For Zinc-Tin Alloy-Coated Stainless Steel Sheet: ASTM B 32, 100 percent tin, with maximum lead content of 0.2 percent, as recommended by sheet metal manufacturer.
2. For lead-coated copper: ASTM B 32, Grade Sn60, 60 % tin and 40% lead, used with rosin flux.

B. Fasteners: Same metal as sheet metal flashing or other non-corrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.

C. Paper Slip Sheet: 5-lb/square (0.244 kg/sq. m) red rosin, sized building paper conforming to FS UU-B-790, Type I, Style 1b.

D. Ice & Water Underlayment: Polyethylene-sheet-backed rubberized asphalt membrane, 40 mils (1.0 mm) thick. Provide primer when recommended by manufacturer.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

   a. Bituthene Ice & Water Shield, W.R. Grace & Co.

E. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

F. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.

G. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant as recommended by portable roll-forming equipment manufacturer for installation indicated; low modulus;

of type, grade, class, and use classifications required to seal joints in sheet metal roofing and remain watertight.

H. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

2.3 ACCESSORIES

A. Sheet Metal Accessories: Provide components required for a complete sheet metal roofing assembly including trim, copings, fasciae, corner units, clips, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items. Match material and finish of sheet metal roofing unless otherwise indicated.

1. Flashing and Trim: Formed from same material and finish as sheet metal roofing.

2.4 FABRICATION, GENERAL

A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.

B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.

D. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

E. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.

F. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.

1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

2.5 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutter: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate as recommended by SMACNA.

Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.

1. Gutter Style: hanging, half round
2. Size: as indicated on drawings
3. Fabricate from: Zinc-Tin Alloy-Coated Stainless Steel
4. Color: unfinished
5. Hangers: surface-mounted

B. Downspouts: Fabricate plain round downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
1. Hanger Style: concealed rack and key set.
2. Size: 3” dia. plain round
3. Fabricate from: Zinc-Tin Alloy-Coated Stainless Steel
4. Color: unfinished

2.6 ROOF SHEET METAL FABRICATIONS

A. Drip Edges: Fabricate from the following materials:
1. Zinc-Tin Alloy-Coated Stainless Steel: 16 oz./sq. ft. (0.55 mm thick).

B. Eave, Rake, and Ridge Flashing: Fabricate from the following materials:
1. Zinc-Tin Alloy-Coated Stainless Steel: 16 oz./sq. ft. (0.55 mm thick).

C. Counterflashing: Fabricate from the following materials:
1. Zinc-Tin Alloy-Coated Stainless Steel: 16 oz./sq. ft. (0.55 mm thick).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.

B. Sheet Metal Flashing Installation: Install sheet metal flashing, roof edge flashings, vent flashing, and edge protection as indicated and in compliance with details and recommendations of the "NRCA Steep Roofing Manual."

1. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Expansion Provisions: Provide for thermal expansion of exposed sheet metal Work. Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

D. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.

1. Do not use torches for soldering. Heat surfaces with irons to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

E. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.

1. Use joint adhesive for nonmoving joints specified not to be soldered.

F. Ice & Water Underlayment:

1. Provide ice and water underlayment under all metal surfaces of built-in gutter and extend up roof slope to point indicated on drawings.

G. Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.

H. Counterflashings: Coordinate installation of counterflashings with installation of assemblies to be protected by counterflashing. Install counterflashings in reglets or receivers. Secure in a waterproof manner by means of snap-in installation and sealant, lead wedges and sealant, interlocking folded seam, or blind rivets and sealant. Lap counterflashing joints a minimum of 2 inches and bed with sealant.

K. Roof Drainage System: Install drainage items fabricated from sheet metal, with straps, adhesives, and anchors recommended by SMACNA's Manual or the item manufacturer, to drain roof in the most efficient manner. Coordinate roof-drain flashing installation with roof-drainage system installation. Coordinate flashing and sheet metal items for steep-sloped roofs with roofing installation. Direct water away from building as indicated in drawings. Provide concrete splash-blocks at grade.

L. Splash Blocks: Provide Precast concrete splash blocks at each (4) downspout location to direct water away from foundation. Use 30” long units. Match color to that of finished and dried parging.

3.4 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION 07620

SECTION 07920 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

A. The Work of this Section includes all labor, materials, equipment and services necessary to complete the joint sealant work as shown on the drawings and specified herein, including but not necessarily limited to the following:

1. Furnishing and installing all sealants in conjunction with this work.
2. Alternate “A”: Window casings to exterior wood siding.
3. Alternate “A”: Window casings to window jambs.
4. Alternate “A”: Standing trim to exterior wood siding
5. Alternate “A”: Exterior door frames to wood siding.
6. Joints at wall penetrations.
7. All other joints indicated and required to be sealed to provide a positive barrier against penetration of air and moisture.

1.3 RELATED WORK

A. Division 6 Section 06401 “Exterior Architectural Woodwork”
B. Division 7 Section 07620 “Sheet Metal Flashing”
C. Division 8 Section 08212 “Wood Doors”
D. Division 8 Section 08550 “Wood Windows”

1.4 QUALITY ASSURANCE

A. Qualification of Installers: Use adequate numbers of skilled personnel who are thoroughly familiar, skilled and specially trained in the techniques of sealant work, and who are completely familiar with the published recommendations of the sealant manufacturer.

1.5 SUBMITTALS

A. Samples: Submit the following:

1. Color samples of sealants to match adjacent materials selected from manufacturer's standard colors.

2. Sealant bond breaker and joint backing.

C. Product Data: Submit manufacturer's technical information and installation instructions for:

1. Sealant materials, indicating that material meets standards specified herein.

2. Backer rods.

D. Submit manufacturer's certification as required by Article 1.6 herein.

1.6 MANUFACTURER'S RESPONSIBILITY AND CERTIFICATION

A. Contractor shall require sealant manufacturer to review the Project joint conditions and details for this Section of the work. Contractor shall submit to the Architect written certification from the sealant manufacturer that joints are of the proper size and design, that the materials supplied are compatible with adjacent materials and backing, that the materials will properly perform to provide watertight, airtight or vapor tight seals (as applicable), and that materials supplied meet specified performance requirements.

1.7 ENVIRONMENTAL CONDITIONS

A. Temperature: Install all work of this Section when air temperature is above forty (40) degrees F. and below eighty (80) degrees F., unless manufacturer submits written instructions permitting sealant use outside of this temperature range.

B. Moisture: Do not apply work of this Section on surfaces which are wet, damp, or have frost.

1.8 HANDLING

A. Protection: Use all means necessary to protect the materials of this Section, before, during and after installation and to protect the installed work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all necessary repairs and replacements.

C. Storage

1. Store sealant materials and equipment under conditions recommended by their manufacturers.

2. Do not use materials stored for a period of time exceeding the maximum recommended shelf life of the material. Do not use expired materials.

1.10 GUARANTEE

A. Provide a written, notarized guarantee from the manufacturer and the applicator stating that the applied sealants shall remain watertight for a period of five (5) years.

B. Guarantee shall be in a form acceptable to the Owner and executed by an authorized individual.

C. Guarantee shall further state that installed sealant is guaranteed against:

1. Adhesive or cohesive failure of sealant joints.

2. Crazing greater than three (3) mils in depth developing on surface of material.

3. Staining of surfaces adjacent to joints by sealants or primer by migration through building materials in contact with them.

4. Chalking, or visible color change on surface of cured sealant.

5. Increase or decrease of "Shore A" durometer hardness (5 second reading) of sealant of more than thirty (30) percent of seven (7) day value of "Shore A" durometer hardness of sealant.

D. Include in guarantee provision, agreement to repair and/or replace, at Contractor's expense, sealant defects which develop during guarantee period, because of faulty labor and/or materials.

PART 2 - PRODUCTS

2.1 SEALANT MATERIALS

A. Exterior Sealant:

1. Sealant at Masonry: Provide two (2) part non-sag urethane sealant meeting the requirements of ASTM C920, Type M, Grade NS, Class 25, Use NT, M, A and O: Dymeric 511 by Tremco, or approved equal.

2. Sealant at Wood and Metals: Provide one (1) part paintable non-sag silicone sealant conforming to ASTM C920, Type M, grade NS, Class 25, and conforming to the following minimum standards in excess of ASTM C920: No. 790 or 795 made by Dow Corning, or approved equal.

B. Interior Wall Sealant: Provide a one (1) part acrylic based sealant conforming to Fed. Spec. TT-S-00230a, equal to "Mono" made by Tremco, or "60 + Unicrylic" made by Pecora or approved equal.

C. Colors of sealant to match adjacent material finishes, including paint and masonry; colors as selected by the Architect.

D. Do not use sealant materials beyond their expiration date.

2.2 MISCELLANEOUS MATERIALS

A. Back-Up Materials: Provide back-up materials and preformed joint fillers, non-staining, non-absorbent, compatible with sealant and primer, and of a resilient nature, such as "Sof-Rod" made by Applied Extrusion Technologies Inc. or approved equal, twenty-five (25) percent wider than joint width. Do not use materials impregnated with oil, bitumen or similar materials shall not be used. Provide back-up materials only as recommended by sealant manufacturer in writing.

B. Provide bond breakers, where required, of polyethylene tape as recommended by sealant manufacturer.

C. Provide primers recommended by the sealant manufacturer for each material to receive sealant. Prime exterior joints prior to sealing. Test primers on all surfaces to be sealed for adequate performance meeting mock-up and project quality standard. Follow manufacturer’s recommendations to achieve adequate primer performance and surface preparation.

D. Provide and use solvents, cleaning agents and other accessory materials as recommended by the sealant manufacturer.

E. Materials shall be delivered to the job in sealed containers with manufacturer's original labels attached. Materials shall be used per manufacturer's printed instructions.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions where joint sealers are to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

A. Sealant Mock-up

1. Prior to commencing sealant installation work at exterior wall, the Contractor shall perform mock-ups of sealant installation, in the presence and at a location determined by the Architect. Mock-ups to include preparation and installation of primers and sealant for each substrate included in the scope of work.

2. Mock-up shall be installed according to manufacturer's requirements and shall not be considered as acceptable until written acceptance is provided by the Architect.

3. Accepted mock-up shall establish installation quality standard, to which all other sealant work shall conform.

B. Supervision: The Contractor shall submit to the Architect written certification from the sealant manufacturer that the applicators have been instructed in the proper application of their materials. The Contractor shall use only skilled and experienced workers for installation of sealant.

C. Apply sealant under pressure with a hand or power actuated gun or other appropriate means. Gun shall have nozzle of proper size and provide sufficient pressure to completely fill joints as detailed. Neatly point or tool joint to provide the contour as indicated on the drawings.

D. Preparation and Application

1. Thoroughly clean all joints, removing all foreign matter such as dust, oil, grease, water, surface dirt and frost. Sealant must be applied to the base surface.

2. Clean non-porous surfaces such as metal chemically. Remove protective coatings on metallic surfaces by solvent that leaves no residue and is compatible with sealant. Use solvent with clean, lint free paper towels, and wipe dry with clean, dry lint free paper towels. Do not allow solvent to air dry without wiping. Clean joint areas protected with masking tape or strippable films as above after removal of tape film.

3. Do not seal joints until they are in compliance with drawings, or meet with the approved mock-up standard.

4. Joint Size and Sealant Size: Joint depth to existing width proportions shall comply with manufacturer's requirements. Depth of joint is defined as distance from outside face of joint to closest point of the filler or backer.

5. Primer: Thoroughly clean joints and apply primer to all surfaces that will receive sealant. Mask adjacent surfaces of joint with non-staining masking tape prior to priming. Apply primer on clean, dry surfaces, and prior to installation of joint backing. Completely wet both inner faces of the joint with primer.

6. Joint Backing: In joints where depth of joint exceeds required depth of sealant, install joint backing (after primer is dry) in joints to provide backing and proper joint shape for sealant. Proper shape for sealant is a very slight "hourglass" shape, with back and front face having slight concave curvature. Use special blunt T-shaped tool or roller to install joint backing to the proper and uniform depth required for the sealant. Joint backing shall be installed with approximately twenty-five (25) percent compression. Do not stretch, twist, braid, puncture, or tear joint backing. Butt joint backing at intersections.

7. Bond Breaker: Install bond breaker smoothly over joint backing that would bond to sealant and at back of joints where joint backing is not required, so that sealant adheres only to the sides of the joint and not backing.

8. Sealant Application: Apply sealant in accordance with the manufacturer's application manual and manufacturer's instructions, using hand guns or pressure equipment, on clean, dry, properly prepared substrates, completely filling joints to eliminate air pockets and voids. Mask adjacent surfaces of joint with non-staining masking tape. Force sealant into joint in front of the tip of the "caulking gun" (not pulled after it) and force sealant against sides to make uniform contact with sides of joint and to prevent entrapped air or pulling of sealant off sides of joint. Fill sealant space full with sealant.

9. Tooling: Tool exposed joints to form smooth and uniform beds, with slightly concave surface. Finished joints shall be straight, uniform, smooth and neatly finished. Remove masking tape immediately after tooling of sealant and before sealant face starts to "skin" over. Neatly remove any excess sealant from adjacent surfaces of joint, leaving the work in a neat, clean condition.

10. Replace sealant which is damaged during construction process.

END OF SECTION 07920

SECTION 08212 - WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Alternate "A": This Section is related to the construction of the new shed. This Section includes the following:
   1. Custom exterior wood board-and-batten doors.

B. Related Sections include the following:
   1. Division 6 Section 06401 "Exterior Architectural Woodwork" for work at door sills, jambs and casings.
   2. Division 8 Section 08711 "Door Hardware"
   3. Division 9 Section 09900 "Exterior Painting" for wood doors.

1.3 SUBMITTALS

A. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data, including those for boards (horizontal rails), diagonal bracing and vertical beaded boards, hardware, and other pertinent data.
   1. Indicate dimensions and locations of mortises and holes for hardware.
   2. Indicate finish requirements.

B. Samples for Selection: Color charts consisting of actual materials in small sections for faces of factory-finished doors with transparent finish. Show the full range of colors available for stained finishes.

C. Samples for Verification: Unfinished corner sections of doors approximately 18 x 18inches (200 by 250 mm) showing edges, faces, joinery, and material qualities of typical board-and-batten construction.

D. Product Certificates: Signed by door manufacturers certifying that the products furnished comply with requirements.

1.4 QUALITY ASSURANCE

A. Quality Standard: Comply with the following standard:

1. AWI Quality Standard: AWI's "Architectural Woodwork Quality Standards" for grade of door, construction, finish, and other requirements.
   a. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced standard and manufacturer's written instructions.

1. Individually package doors in plastic bags or cardboard cartons.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Board-and-batten wood doors, swinging.
   a. Starke Millwork.
   b. Or approved equal.

2.2 DOORS OF SPECIAL DESIGN AND CONSTRUCTION

A. Exterior Board-and-Batten Doors: Comply with the following requirements:

1. Wood Species: Western red cedar or mahogany.
2. Grade: Premium or Select.
3. Finish: Paint.
4. Battens: As indicated on drawings.
5. Diagonal bracing: As indicated on drawings.
6. Vertical boards: As indicated on drawings.

2.3 FABRICATION

A. Fabricate board and batten doors from material that is stable and straight, not prone to warping or twisting upon fabrication and installation.

B. Fabricate board and batten wood doors in sizes indicated for Project site fitting.

C. Attach boards to battens using traditional clinched nail fabrication.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
2. Reject doors with defects.

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

3.2 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware."

B. Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.

1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold.
2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.

C. Field-Finished Doors: Refer to the following for finishing requirements:

1. Division 9 Section "Exterior Painting."

3.3 ADJUSTING AND PROTECTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Refinish or replace doors damaged during installation.

C. Protect doors as recommended by door manufacturer to ensure that wood doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08212

SECTION 08550 - WOOD WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Alternate "A": This Section is related to the construction of the new shed. This Section includes the following:
   1. New wood window sash and frames as indicated on drawings

B. Related Sections include the following:
   1. Division 6 Section 06401 "Exterior Architectural Woodwork"
   2. Division 7 Section 07920 "Joint Sealants"
   3. Division 8 Section 08711 "Door Hardware"
   4. Division 9 Section 09900 "Exterior Painting"

1.3 DEFINITIONS

A. Performance grade number, included as part of the AAMA/NWWDA product designation code, is actual design pressure in pounds force per square foot (pascals) used to determine structural test pressure and water test pressure.

B. Structural test pressure, for uniform load structural test, is equivalent to 150 percent of design pressure.

C. Minimum test size is smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

1.4 NEW WINDOW PERFORMANCE REQUIREMENTS

A. General: Provide wood windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified and that are of test size indicated below:

   1. Minimum size required by AAMA/NWWDA 101/I.S.2.

B. AAMA/NWWDA Performance Requirements: Provide new wood windows of the performance class and grade indicated that comply with AAMA/NWWDA 101/I.S.2.

1. Performance Class: R.
2. Performance Grade: Minimum for performance class indicated.

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of wood window indicated.

B. Shop Drawings for new windows and sashes: Include plans, elevations, sections, details, hardware, attachments to other Work, operational clearances, and the following:

1. Muntin details, including reinforcement and stiffeners.
2. Joinery details.
3. Expansion provisions.
4. Flashing and drainage details.
5. Weather-stripping details.
6. Glazing details.
7. Hardware installations.

C. Samples for Verification: For new wood window components required, prepared on Samples of size indicated below.

1. Architect reserves the right to require additional samples that show fabrication techniques, workmanship, and design of hardware and accessories.

D. Maintenance Data: For operable window sash operating hardware and weather stripping to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. New window manufacturer’s qualifications: Window manufacturers to be a domestic company which has been in business for a minimum of five (5) years and manufactured wood windows similar in scope, materials and craftsmanship to the requirements of this project

B. Product Options: Information on Drawings and in Specifications establishes requirements for wood windows' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

C. Fenestration Standard: Comply with AAMA/NWWDA 101/I.S.2, "Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors," for minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install windows until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during the remainder of the construction period to comply with requirements of the referenced quality standard for Project's geographical location.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect windows during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Mark each window with individual opening numbers used on Shop Drawings. Use removable tags or concealed markings.

1.9 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace wood windows that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Failure to meet performance requirements.
2. Structural failures including excessive deflection.
3. Water leakage, air infiltration, condensation or joint separation.
4. Faulty operation of movable sash and hardware.
5. Deterioration of exterior finish beyond normal weathering.
6. Deterioration of interior or exterior finishes caused by failure of other window components.
7. Glazing failures including seals and stress cracks.

C. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Wood Windows:
1. Basis-of-Design Product: Subject to compliance with requirements, provide wood windows or comparable product by one of the following:

a. Marvin Windows & Doors: Awning window # WUAWN2428 with the following criteria.
1) 4 pane true divided light
2) Primed wood interior and exterior
3) 7/8” Muntins
4) Hardware as indicated below

2.2 MATERIALS, GENERAL

A. Water Repellant Preservative Treatment: Refer to Division 6 Section “Exterior Architectural Woodwork.”

B. Wood for new Windows: Clear ponderosa or eastern white pine or another suitable close grained hardwood; kiln-dried to a moisture content of 6 to 12 percent at time of fabrication; free of finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch (0.8 mm) deep by 2 inches (51 mm) wide; water-repellent preservative treated.

C. Wood Window: New elements.

1. Sills: manufacturer’s standard.
2. Jambs and beads: manufacturer’s standard.
3. Casings: As indicated on drawings.

D. Fasteners for both new and restored windows: Comply with manufacturer’s recommendations and accepted industry standards.

1) All fasteners used to attach frame components to be stainless steel.

2) All fasteners used to attach hardware to be solid brass.

3) Removable sash stops to be attached with solid brass, slotted screws.

E. Anchors, Clips and Accessories for new and restored windows: Comply with manufacturer’s recommendations and accepted industry standards.

1) All anchors, clips and accessories used to attach frame components to be stainless steel.
2) Alternate materials must be approved by Architect.

F. Reinforcing Members for new and restored windows: Comply with manufacturer's recommendations and accepted industry standards.

G. Weather Stripping for new Windows: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and completely concealed when wood window is closed.
   1. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/NWWDA 101/I.S.2.

   2. Weather Seals: Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material.

2.3 GLAZING

A. Float Glass: ASTM C 1036, Type I (transparent glass flat), Class as indicated below, and Quality Q3 (glazing select).

   1. Class 1 (clear), 1/8" dsb.

2.4 HARDWARE

A. Manufacturer's standard for new windows.

2.5 FACTORY FABRICATION

A. General: Fabricate wood windows, in sizes indicated, that comply with AAMA/NWWDA 101/I.S.2 for performance class and performance grade indicated. Include a complete system for assembling components and anchoring windows.

B. Fabricate wood windows that are reglazable without dismantling sash.

C. Weather Stripping: Provide full-perimeter weather stripping for each operable sash, unless otherwise indicated.

D. Factory machine windows for openings and hardware that is not surface applied.

E. Factory-Glazed Fabrication: Except for light sizes in excess of 100 united inches (2500 mm width plus length), glaze wood windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 8 Section "Glazing" and with AAMA/NWWDA 101/I.S.2.

F. Glazing: Provide glazing systems indicated on drawings and in coordination with specified Glazing.

G. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

H. Provide 96” Crank Pole at each window unit.

2.6 WOOD FINISHES

A. All millwork exposed to weather or other dissimilar materials shall be given wood preservative treatment as specified.

B. All work shall be primed and backprimed.

C. Factory-Primed Windows: Provide manufacturer's standard factory-prime coat on exposed interior and exterior surfaces. Ensure compatibility of primer with finish coats specified in Section 9 “Exterior Painting.”

PART 3 - EXECUTION

3.1 EXAMINATION

A. Field Measurements and Examination: Contractor to thoroughly review construction documents and drawings to ensure that his measurements will conform to the new components to be fabricated.
   1. Determine accurate sash or window unit opening.
   2. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances; rough opening dimensions; levelness of sill plate; coordination with wall flashings, vapor retarders, and other built-in components; and other conditions affecting performance of work.
   3. Masonry Surfaces: Assure adjacent surfaces are visibly dry and free of excess mortar, sand, and other construction debris.

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

3.2 INSTALLATION

A. General:
   1. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components; Drawings; and Shop Drawings.
   2. Install to match installation, appearance, alignment and plane of existing window called out in Drawings.

3. Install so that relationship of window to interior and exterior finish will be consistent with existing windows.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.

D. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in "Dissimilar Materials" Paragraph in Appendix B in AAMA/NWWDA 101/I.S.2.

3.3 ADJUSTING

A. Adjust operating sashes, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and moving parts.

3.4 PROTECTION AND CLEANING

A. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 08550

SECTION 08711 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Alternate "A": This Section is related to the construction of the new shed. This Section includes the following:

1. Door hardware for the following:

a. New exterior wood doors.

1.3 SUBMITTALS

A. Product Data: Include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Door Hardware Schedule: Indicate type, style, function, size, label, hand, manufacturer, fasteners, location, and finish of each door hardware item. Include description of each electrified door hardware function, including sequence of operation

C. Keying Schedule: For each lock, showing coordination with owner's standards, prepared by a qualified hardware supplier.

D. Maintenance Data: For each type of door hardware to include in maintenance manuals specified in Division 1.

E. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Supplier Qualifications: Person who is or employs a qualified DHI Architectural Hardware Consultant.

B. Installer Qualifications: An experienced installer who has completed door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Regulatory Requirements: Comply with provisions of the following:

1. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)", as follows:
    a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
    b. Thresholds: Not more than 3/4 inch (19 mm) high for exterior doors. Bevel raised thresholds with a slope of not more than 1:2.
2. NFPA 101: Comply with the following for means of egress doors:
    a. Latches, Locks, and Exit Devices: Not more than 15 lbf (67 N) to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
    b. Door Closers: Not more than 30 lbf (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Deliver keys to Owner as determined with Architect and Owner at site.

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.7 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Five (5) years from date of Substantial Completion, unless otherwise indicated.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: Beginning at Substantial Completion, provide six months full maintenance by skilled employees of Hardware Installer. Include quarterly preventative maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door hardware operation. Provide parts and supplies as used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this Section:

1. Door Hardware: Provide quantity, item, size, finish or color indicated.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Schedule at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

2.2 HINGES

A. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:

1. Strap Hinges: James Peters and Son Hardware.

B. Standards: Comply with the following:

1. BHMA A156.20.

C. Quantity: Provide the following, unless otherwise indicated:

1. Two (2) Hinges per swinging door.

D. Size: Provide hinges of the size recommended by the manufacturer for the thickness, height, weight and application of each door.

E. Template Requirements: Except for hinges to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

F. Hinge Weight: Unless otherwise indicated, provide the following:

1. Entrance Doors: per manufacturer’s recommendations.

G. Hinge Base Metal: Unless otherwise indicated, provide the following:

1. Exterior Hinges: Wrought steel.
2. Finish: Painted.

H. Fasteners: Comply with the following:

1. Carriage Bolts: 3/8" x 2-1/2" for wood doors and frames.

2.3 LOCKS AND LATCHES

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Von Duprin
2. Ball and Ball
3. James Peters and Son
4. Richards-Wilcox

2.4 DOOR BOLTS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Ball and Ball
2. James Peters and Son
3. Richards-Wilcox

2.5 STRIKES

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Ball and Ball
2. Von Duprin
3. Richards-Wilcox
4. James Peters and Son

B. Coordinate strikes with specified bolts and latches.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

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

3.2 INSTALLATION

A. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

B. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

3.3 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

B. Adjust sweep period on door closers so that from an open position of 70 degrees, the door will take at least three seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

3.4 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.5 DOOR HARDWARE SCHEDULE

Door Hardware Set No. #1 (Door 101)

4	Strap Hinge	#8036	James Peters & Son	Wrought Steel	Black
4	Pintles	#8000-1	James Peters & Son	Wrought Steel	Black
1	Interior Pull - 8” Bow Handle	#0081-00002	Richards- Wilcox	Steel	Powder Coat
1	Latch	#0128.00011ZC	Richards- Wilcox	Steel	Zinc Plated
1	Latch Padlock Staple	#0128.00014	Richards- Wilcox	Steel	Zinc Plated
2	Cane Bolts - 24”	#0524.00023	Richards- Wilcox	Steel	Zinc Plated
1	Spring Bolt	#0514.00038	Richards- Wilcox	Steel	Powder Coat
1	Spring Bolt Keeper	#0434.00027	Richards- Wilcox	Steel	Powder Coat

END OF SECTION 08711

SECTION 09900 – EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes surface preparation and field painting of exposed exterior surfaces including the following:

1. Alternate "A": Painting of exterior wood cornice, fascia, siding, and all standing and running trim.
2. Alternate "A": Painting of exterior window jambs, sills and exterior trim.
3. Alternate "A": Painting of interior and exterior of window sash.
4. Alternate "A": Painting of exterior wood doors and exterior frames.
5. Painting of metal fences.

B. Related Sections include the following:

1. Division 5 Section 05521 "Metal Pipe Railings"
2. Division 5 Section 05730 "Decorative Metal Fences and Gates"
3. Division 6 Section 06401 "Exterior Architectural Woodwork"
4. Division 8 Section 08212 "Wood Doors"
5. Division 8 Section 08550 "Wood Windows"

1.3 GENERAL

A. Surface preparation, priming and finish coats specified in this section are in addition to shop priming specified in other Sections.

B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.

C. Do not paint pre-finished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Submittals: For each paint system specified, provide the following:

1. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use. Include temperature and humidity limitations.

E. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.

F. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

G. Source Limitations: Obtain primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

H. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and including the following information:

1. Product name or title of material.
2. Product description
3. Manufacturer’s stock number and date of manufacture
4. Contents by volume, for pigment and vehicle constituents
5. Thinning instructions
6. Application instructions.
7. Color name and number
8. VOC content

I. Extra Materials: Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

1. Quantity: 5% (percent) but not less than 1 gallon (3.8 L) of each material and color applied.

J. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers in clean condition, free of foreign materials and residue. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing and application.

K. Project Conditions: Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than those specified by the manufacturer; or to damp or wet surfaces.

1. Apply water based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg. F (10 and 32 deg. C).

L. Definitions: The following definitions shall apply to painting work:

1. Scrape and Paint: Where indicated on the drawings, these surfaces shall be prepared for painting as described in "Surface Preparation" described in Section 09900, Paragraph 3.1.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

B. Material Compatibility: Provide primers, undercoats, and finish-coat materials from a single source manufacturer that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

C. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials indicates that products named are required to be used.

D. All materials identified in Section 3.2 EXTERIOR PAINTING SCHEDULE

PART 3 - EXECUTION

3.1 EXECUTION

A. Examine substrates, areas, and conditions under which painting will be performed for compliance with paint application requirements. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates.

C. Preparation: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

D. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

E. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.

1. Wood: Remove only loose paint by scraping. Well-adhered paint may remain and be repainted. Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

   a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried and spot prime filler.

   b. Scrape and feather edges of well-adhered paint to remain. Sand or otherwise reduce edge using method producing minimum of airborne dust.

2. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, rust and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council’s (SSPC) recommendations.

3. Non-Ferrous Metals: Clean non-ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale and other foreign substances. Use solvent or mechanical cleaning methods that comply with manufacturer’s recommendations.

F. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.

1. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

a. Use only thinners approved by paint manufacturer and only within recommended limits.

G. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

H. Application: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in items are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
6. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.

I. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
3. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

J. Temperature and Humidity Considerations: Apply paints strictly in accordance with manufacturer’s requirements for temperature and humidity.

K. Application Procedures: Apply paints and coatings by brush, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

L. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

M. Prime Coats: Provide one (1) complete prime coat. Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

N. Topcoats: Provide two (2) complete topcoats. Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.

O. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

P. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

Q. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

1. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
2. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.2 EXTERIOR PAINTING SCHEDULE BY SUBSTRATE MATERIAL

A. Wood: Provide the following finish systems over all new wood elements including eave trim, cornices, doors, door trim, window sash and window trim and siding.

1. Low-Luster Acrylic Finish: Two finish coats over a primer.

   a. Primer Coats: 1 coat Benjamin Moore Fresh Start Penetrating Alkyd Primer 100.
   Color: Compatible with Topcoats

   b. Finish Coats: 2 coats MoorGard® 100% Acrylic Low Lustre Latex House Paint N103.
   Color: To be selected by architect from manufacturer's full range of colors.

B. Steel & Iron:

1. Shop-Primed Steel Finish: Prepare surfaces to comply with SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning" and apply primer to comply with SSPC-PA 1.
2. All metalwork shall be painted black, as follows:
   a. Primer: Benjamin Moore D.T.M. P04-01.
   b. Acrylic: Benjamin Moore D.T.M. M29.

END OF SECTION 09900

SECTION 10751 - GROUND-SET FLAGPOLES

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 ground-set aluminum flagpole with flag and pole-mounted light.

B. Related Sections:
   1. Section 03300: Cast-in-Place Concrete
   2. Section 16000 : Electrical
   3. Section 16111: Conduit
   4. Section 16120: Wires and Cables
   5. Section 16520: Lighting

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

   1. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.

B. Shop Drawings: For flagpoles.

   1. Include plans, elevations, and attachment details. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support.
   2. Include section, and details of foundation system.

C. Samples for Verification: For each type of exposed finish, in manufacturer's standard sizes.

D. Delegated-Design Submittal: For flagpoles.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design flagpole assemblies.

B. Seismic Performance: Flagpole assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

C. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand design loads indicated within limits and under conditions indicated.

1. Wind Loads: Determine according to NAAMM FP 1001. Basic wind speed for Project location is 5 mph.
2. Base flagpole design on nylon or cotton flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

2.3 ALUMINUM FLAGPOLES

A. Aluminum Flagpoles: Entasis-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm).

1. Basis-of-Design Product: Subject to compliance with requirements, provide Acme/Lingo Flagpoles LLC, or comparable product by one of the following:

a. American Flagpole; a Kearney-National Inc. company.
b. Baartol Company.
c. Concord Industries, Inc.
d. Eder Flag Manufacturing Company, Inc.
e. Ewing Flagpoles.
f. Morgan-Francis Flagpoles and Accessories.
g. Pole-Tech Company Inc.
h. U.S. Flag & Flagpole Supply, LP.

B. Exposed Height: 25 feet (7.5 m).

C. Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:

1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.

D. Foundation: 24” diameter sonotube, 3’-0” deep, with 6” gravel base at bottom for drainage. Retain mounting types in remaining paragraphs below to suit flagpole installation.

E. Cast-Metal Shoe Base: Made from aluminum with same finish and color as flagpoles for anchor-bolt mounting. Furnish with anchor J-bolts, ¾” x 24” with 3-1/4” projection, 4 total.

2.4 FITTINGS

A. Flag Light: Bayville Post Light, by Magniflood. Refer to Lighting Specification Section 16520 for information.

B. External Halyard: Ball-bearing, nonfouling, revolving truck assembly of cast metal with continuous 5/16-inch- (8-mm-) diameter, braided polypropylene halyard and 9-inch (228-mm) cast-metal cleats with fasteners. Finish exposed metal surfaces to match flagpole.

1. Halyards and Cleats: Two at each flagpole.
2. Cleat Covers: Cast metal, finished to match flagpole, secured with cylinder locks.
3. Halyard Covers: 2-inch (50-mm) channel, 60 inches (1500 mm) long, finished to match flagpole.
4. Halyard Flag Snaps: Brass swivel snap hooks with lockable covers. Furnish two per halyard.

2.5 MISCELLANEOUS MATERIALS

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M.

B. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.

C. Elastomeric Joint Sealant: Single-component nonsag silicone joint sealant complying with requirements in Section 07920 "Joint Sealants."

D. United States Flag: 5’ x 8’, 2-ply mercerized cotton bunting with heavy canvas duck heading and #2 rolled rim, solid brass grommets.

2.6 ALUMINUM FINISHES

A. Natural Satin Finish: AA-M32, fine, directional, medium satin polish; buff complying with AA-M20; seal aluminum surfaces with clear, hard-coat wax.

PART 3 - EXECUTION

3.1 PREPARATION

A. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.

B. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.

C. Anchor Bolts: Locate and secure anchor bolts in forms with templates and by tying to reinforcement.

D. Place concrete, as specified in Section 03300 "Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for no fewer than seven days or use nonstaining curing compound.

E. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

F. Coordinate flagpole light installation prior to flagpole placement on baseplate.

3.2 FLAGPOLE INSTALLATION

A. General: Install flagpoles where indicated and according to Shop Drawings and manufacturer's written instructions.

B. Baseplate: Cast anchor bolts in concrete foundation. Install baseplate on washers placed over leveling nuts on anchor bolts and adjust until flagpole is plumb. After flagpole is plumb, tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate.

END OF SECTION 10751

SECTION 131000 - LIGHTNING PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SCOPE OF WORK

A. Alternate "A": Lightning protection as specified below at the following buildings or structures:
   1. New shed

1.3 SUBMITTALS

A. Product Data: For air terminals and mounting accessories.

B. Shop Drawings: Detail lightning protection system devices, including air-terminal locations, conductor routing and connections to grounding conductor.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who is NRTL listed or who is certified by Lightning Protection Institute (LPI) as a Master Installer/Designer.

B. Listing and Labeling: As defined in NFPA 780, Article 2-2, "Definitions."

C. Provide LPI certification of system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

   1. Zeus Lighting Rods
   2. Automatic Lightning Protection.
   3. East Coast Lightning Equipment, Inc.
   4. Harger Lightning Protection, Inc.

2.2 LIGHTNING PROTECTION SYSTEM COMPONENTS

A. Comply with UL 96.

B. Conductors at roof: Stranded aluminum cable.

C. Down Conductors: Stranded copper cable.

D. Ground Rods: Solid copper.

E. Roof-Mounting Air Terminals: NFPA Class II, aluminum, solid, concealed ridge assembly, unless otherwise indicated.

F. Use approved bimetallic connectors between aluminum and copper components.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install lightning protection components and systems according to NFPA 780.

B. Install conductors with direct paths from air terminals to ground connections. Avoid sharp bends and narrow loops.

C. Cable Connections: Use approved exothermic-welded connections for all conductor splices and connections between conductors and other components.

3.2 CORROSION PROTECTION

A. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture unless moisture is permanently excluded from junction of such materials.

3.3 FIELD QUALITY CONTROL

A. Periodic Inspections: Engage an LPI inspector to perform periodic inspections during construction and at its completion, according to LPI-177.

END OF SECTION 13100

SECTION 16000 - ELECTRICAL

PART 1 - GENERAL

1.1 APPLICATION

A. This Section applies to all sections of Division 16 of this project, except as specified otherwise in the individual sections.

1.2 SCOPE OF WORK

A. This specification and accompanying drawings are intended to illustrate the nature of work to be performed in a diagrammatic manner. All labor, material, and equipment necessary for a complete electrical installation shall be included by the Contractor in the submission of his bid.

B. Appliances, materials or equipment obviously a part of the system necessary for its satisfactory operation, although not specifically mentioned herein or indicated on the drawings shall be provided by this Contractor without extra cost to the Owner.

C. Material and equipment mentioned and described in this specification shall be supplied complete in all details. Contractors bidding on this project shall insure themselves that the quotations that they use for equipment have been quoted in accordance with the specifications and the drawings. Errors by manufacturers' representatives shall not relieve the Contractor to provide the proper equipment of the obligation.

D. Without intending to limit or restrict the volume of work provided by this section of the contract documents, the work generally consists of the following.

- Site preparation, within the boundaries shown on the Contract Drawings and as specified herein. **Note: The Contractor is strongly advised to ascertain the existence and nature of any underground structures and the routing of underground utilities by his own means and methods prior to trenching for required new conduits. Coordinate with PSE&G, Verizon, AT&T, the City's DEP and others prior to commencing excavation.**

- Installation of conduit, wire, lighting fixtures, load center and other items and appurtenances as indicated on the Contract Drawings and specified herein.

- Maintenance and continuity of operations of the existing facility without any disruption in service.

- Provide, at the Contractor's own expense, all temporary services including, but not limited to, power, lighting, telephone, site security.

- Maintenance and protection of traffic at all times during construction.
- Schedule and coordinate the work with the Owner, Utility Companies and other Contractors doing work.
- Daily clean-up of site including removal of rubbish, scrap and sweeping area including dust control.
- Obtaining state and local permits and approvals as required.
- All other work, as shown on the Contract Drawings and as delineated in these Specifications, required for a complete and satisfactory operating installation.

1.3 LAWS, PERMITS, AND REGULATIONS

A. Obtain and pay for all licenses, certificates and permits required by law, State, County, and all Authorities having jurisdiction. Comply with the rules and requirements of the National Board of Fire Underwriters and the National Electric Code and with all governing laws, orders, regulations, and building codes. Any deviation shall be reported to the Borough or its representative in writing, for approval.

B. Certificates of approval from the above authorities shall be delivered to the Borough before final payment may be made. This Contractor shall pay the necessary fees for all inspections and certificates.

1.4 CODES, LISTINGS AND STANDARDS:

A. All electrical work covered by the Contract Documents shall conform to the requirements of the National Electrical Code.

B. All equipment and materials for which Underwriters' Laboratories, Inc. provides product listing service shall be Underwriter laboratories' approved and bear the U.L. Label.

C. Equipment and materials wherever applicable shall conform to the following standards:

1. Federal Specifications (Fed. Spec.).
2. National Electrical Manufacturers Association (NEMA).
3. Institute of Electrical and Electronic Engineer of Constructions (IEEE).
4. American National Standards Institute (ANSI).
5. Insulated Cable Engineer of Constructions Associations (ICEA).

1.5 PROTECTION OF WORK AND MATERIALS

A. This Contractor shall be responsible for the proper care and protection of all portions of materials delivered and work prepared by him until completion and acceptance of the work and the issue of certificates in final payment.

1.6 MATERIALS AND WORKMANSHIP

A. All materials shall be new, recently manufactured and of the best quality.

B. All work shall be performed in a first-class, neat and workman-like manner by mechanics skilled in their trades.

C. Where the words "provide", “furnish”, “install” and "supply" are used in the specifications or on the drawings, they shall be understood to mean the complete work in connection therewith, that is, furnishing, installing, testing, connecting, and warrantees of the items specified.

1.7 SHOP DRAWINGS

A. After contract award, this Contractor shall submit all shop drawings for approval within three (3) weeks.

1.8 PERFORMANCE OF EQUIPMENT

A. All materials, equipment, and appurtenances of any kind shown on the drawings, hereinafter specified, or required for the completion of the work in accordance with the intent of these specifications, shall be completely satisfactory and acceptable as regards operation, performance and capacity.

B. No acceptance, written or verbal, of any drawings, descriptive data or samples of such material, equipment and/or appurtenances shall relieve the Contractor of his responsibility to turn over the complete installation to the Borough in perfect working order and in complete conformance with the drawings and specifications at the completion of the work.

C. Operation, capacity or performance of which does not comply with the requirements of the drawings or specifications, or which is damaged prior to acceptance by the Borough will be held to be defective material and shall be removed and replaced with proper and acceptable materials, equipment and/or appurtenances, or put in proper working order, satisfactory to the Engineer of Construction without additional cost to the Borough.

D. All moving parts of equipment and appurtenances, shall be properly lubricated by the Contractor and shall be started up and tested by him.

E. All equipment shall operate without objectionable noise or vibration as determined by the Engineer of Construction. If such objectionable noise or

vibration should be produced and transmitted to occupied portions of the building by apparatus, piping, ducts or other parts of the work, any necessary changes, as approved, shall be made without cost to the Borough.

1.9 DELIVERY AND STORAGE

A. Equipment and materials shall be properly stored, adequately protected and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored and protected in accordance with the manufacturer's recommendations and as approved by the Engineer of Construction. Electrical conduit shall be stored to provide protection from the weather and accidental damage. Cables shall be sealed, stored and handled carefully to avoid damage to the outer covering or insulation and damage from moisture and weather. Outdoor storage of cable will not be permitted. Damaged or defective items, in the opinion of the Borough's representative, shall be replaced with new items at no additional cost to the Borough.

1.10 CATALOGED PRODUCTS

A. Materials and equipment shall be the cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be manufacturer's latest standard design that complies with the specification requirements.

1.11 MANUFACTURER'S RECOMMENDATION

A. Where installation procedures are specified to comply with the recommendations of the manufacturer of the material or equipment being installed, printed copies of these recommendations shall be furnished to the Borough prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

1.12 COORDINATION

A. Electrical work shall be coordinated with Owner's representative and other trades involved in the construction project. Electrical shut-downs shall be scheduled with the Owner 48 hours in advance.
   1. Any electrical work inside the house must be coordinated with the Project Manager 48 hours prior to start.

B. Contractor shall comply with all local Power Company requirements.

1.13 ENCLOSURES

A. Furnish NEMA enclosures to suit location classification, unless otherwise shown on the drawings, or referenced in the specifications. The outdoor area shall be considered as requiring NEMA 3R rated equipment.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. All materials, equipment, and devices shall, as a minimum, meet the requirements of UL where UL Standards are established for those items, and the requirements of NFPA 70. All items shall be new unless specified or indicated otherwise.

2.2 CONDUITS

A. Refer to Section 16111.

2.3 OUTLET BOXES AND COVERS

A. Outlet boxes and covers shall be cadmium- or zinc-coated if of ferrous metal and shall conform to UL 514

B. Cabinets, junction boxes, and pull boxes (with volume greater than 100 cubic inches) shall conform to UL 50. Cabinets, junction boxes, and pull boxes shall be hot-dip zinc-coated if of sheet steel.

2.4 WIRES AND CABLES

A. Refer to Section 16120.

2.5 SPLICES AND TERMINATION COMPONENTS

A. Splices and termination components shall conform to UL 486A and UL 486B, as applicable for wire connectors, and UL 510 for insulating tapes. Connectors for wires No. 10 AWG and smaller shall be insulated pressure-type in accordance with UL 486A or UL 486C (twist-on splicing connector). Provide solderless terminal lugs on stranded conductors.

2.06 SWITCHES

A. Switches serving as motor-disconnect means shall be horsepower rated. Provide heavy duty type switches where indicated, where switches are rated higher than 208 volts, and for double throw switches. Fused switches shall utilize Class R fuseholders and fuses, unless indicated otherwise.

2.07 PANELBOARDS

A. Panel shall be a type QO load center similar or equal to Catalog #QO24L70 F/S, single phase, three (3) wire, with 70 amp mains, as manufactured by Square D.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Electrical installation shall conform to the requirements of NFPA 70, State and Local Codes, and to the requirements specified herein.

3.2 WIRING METHODS

A. Wiring method shall be insulated conductors installed in conduit, except where specifically indicated or specified otherwise, or required by NFPA 70 to be installed otherwise. An insulated equipment grounding conductor shall be provided in all feeder and branch circuits, including lighting circuits.

3.3 CONDUIT INSTALLATION

A. Keep conduit at least 6 inches away from parallel runs of flues and steam or hot water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members where located above accessible ceilings and where conduit will be visible after completion of project.

3.4 CONDUIT SUPPORT

A. Support conduit by pipe straps, wall brackets, hangers or ceiling trapeze. Fasten by wood screws to wood; by toggle bolts on hollow masonry units; by concrete inserts of expansion bolts on concrete or brick; by machine screws, welded threaded studs, or spring-tension clamps on steel work. Threaded C-clamps may be used on rigid steel conduit only. Do not weld conduits or pipe straps to steel structures. The load applied to fasteners shall not exceed one-fourth of the proof test load. Fasteners attached to concrete ceiling shall be vibration and shock resistant. Holes cut to a depth of more than 1-1/2-inches in reinforced concrete beams or to a depth of more than 3/4-inch in concrete joints shall not cut the main reinforcing bars. Fill holes that are not used.

B. Make changes in direction of runs with symmetrical bends or cast-metal fittings. Make field-made bends and offsets with a hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits. Prevent

plaster, dirt, or trash from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of all observations.

C. Install pull wires in empty conduits in which wire is to be installed by others. The pull wire shall be No. 14 AWG zinc-coated steel or plastic having not less than 200 pounds tensile strength. Leave not less than 12 inches of slack at each end of the pull wire.

D. Fasten conduits to sheet metal boxes and cabinets with two locknuts where required by NFPA 70. Where insulated bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, use at least a single locknut and bushing. Locknuts shall be tye type with sharp edges for digging into the wall of metal enclosures. Install bushings on the ends of conduits and provide insulating type where required by NFPA 70.

E. Flexible connections of short length shall be provided for equipment subject to vibration, noise transmission, or movement; and for all motors. Liquid-tight flexible conduit shall be used in wet locations. A separate ground conductor shall be provided across flexible connections.

3.5 BOXES, OUTLETS, AND SUPPORTS

A. Provide boxes in the wiring or raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures. Boxes for metallic raceways shall be of cast-metal hub type when located in normally wet locations, when surface mounted on outside of exterior surfaces or when exposed up to 7 feet above interior floors and walkways, and when installed in hazardous areas. Boxes in other locations shall be sheet steel. Each box shall have the volume required by NFPA 70 for the number of conductors enclosed in the box. Boxes for use in masonry block or tile walls shall be square-cornered tile-type, or standard boxes having square-cornered tile-type covers. Provide gaskets for cast-metal boxes installed in wet locations and boxes installed flush with the outside of exterior surfaces. Fasten boxes and supports with wood screws on wood, with bolts and expansion shields on concrete or brick, with toggle bolts on hollow masonry units, and with machine screws or welded studs on steel work. Threaded studs driven in by power charge and provided with lockwashers and nuts or nail-type nylon anchors may be used in lieu of wood screws, expansion shield, or machine screws.

B. In open overhead spaces, cast boxes threaded to raceways need not be separately supported except where used for fixture support. Support sheet metal boxes directly from the building structure or by bar hangers. Where bar hangers are used, attach the bar to raceway on opposite sides of the box and support the raceway with any approved type fasteners not more than 24 inches from the box. When penetrating reinforced-concrete members, avoid cutting any reinforcing steel.

C. Construct of not less than the minimum size required by NFPA 70 of code-gauge aluminum or galvanized sheet steel, except where cast-metal boxes are required in locations specified above, Furnish boxes with screw-fastened covers. Where several feeders pass through a pull box, tag the feeders to indicate clearly the electrical characteristics, circuit number, and panel designation.

3.6 CONDUCTOR IDENTIFICATION

A. Provide conductor identification within each enclosure where a tap, splice, or termination is made. For conductors No. 6 or smaller, color coding shall be by factory-applied color-impregnated insulation. For conductors No. 4 and larger, color coding shall be by plastic-coated self sticking markers, colored nylon cable ties and plates, or heat-shrink type sleeves. Identify control circuit terminations.

B. Complete and/or modify all panelboard circuit cards to accurately reflect the work done.

3.7 SPLICES

A. Make splices in accessible locations. Make splices in conductors No. 10 AWG and smaller with an insulated pressure type connector. Make splices in conductors No. 8 AWG and larger with a solderless connector and cover with an insulation material equivalent to the conductor insulation.

3.8 COVERS AND DEVICE PLATES

A. Install with all four edges in continuous contract with finished wall surfaces without the use of mats or similar devices. Plaster fillings will not be permitted. Plates shall be installed with an alignment tolerance of 1/16-inch. The use of sectional type device plates will not be permitted. Plates installed in wet locations shall be gasketed.

3.9 GROUNDING AND BONDING

A. Ground all exposed non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in non-metallic raceways, and neutral conductor or wiring systems. Make ground connection at the main service equipment and extend grounding conductor to the point of entrance of the metallic water service. Make connection to the water pipe by a suitable ground clamp or lug connection to a plugged Tee. If flanged pipes are encountered, make connection with the lug bolted to the street side of the flanged connection. Supplement the metallic water service grounding system with an additional make electrode in compliance with NFPA 70. Where ground fault protection is employed, take care that the connection of ground and neutral does not interfere with the correct operation of the fault protection.

3.10 GROUNDING CONDUCTOR

A. Provide an insulated, green colored equipment grounding conductor in all feeder and branch circuits. This conductor shall be separate from the electrical system neutral conductor.

3.11 REPAIR OF EXISTING WORK

A. Lay out the work carefully in advance. Where cutting, channeling, chasing, or drilling of floors, walls partitions, not ceilings, or other surfaces is necessary for the proper installation, support, or anchorage of the conduit, raceways, or other electrical work, do this work carefully. Repair any damage to buildings, piping, or equipment using mechanics of the trades involved.

3.12 TESTING

A. The Contractor shall provide all test equipment and personnel and submit written copies of all test results.

B. Test all 600-Volt wiring to verify that no short circuits or accidental grounds exist.

C. Test the grounding system to assure continuity and that the resistance to ground is not excessive (i.e.: greater than 25 Ohms.)

D. Tests as required for all component parts of the complete installation shall be performed by the contractor to demonstrate the satisfactory functioning of all electrically operated equipment and wiring and the adequacy of the entire electrical system.

E. Any equipment or materials furnished and/or installed under this contract which fails under tests shall be repaired or replaced and then retested until satisfactory results are obtained, entirely at the expense of the contractor. He shall assume full responsibility for the proper functioning and quality of all electrical installations to the extent that any breakdowns, deficiencies or deteriorations caused by poor workmanship, inferior equipment furnished by the contractor, materials or methods of installation shall be promptly remedied, replaced or repaired by the contractor.

END OF SECTION 16000

SECTION 16111 - CONDUIT

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install conduit and fittings to form complete, coordinated and grounded raceway systems.

B. All conduits shall be as follows except as otherwise noted herein or shown on the contract drawings.

1. Rigid steel conduit for exposed conduit runs and for fire/smoke detection risers.
1. Intermediate metallic conduit for exposed conduit runs.
2. PVC coated rigid steel for exposed conduit runs in corrosive areas or for direct burial and in all outdoor areas.
3. Schedule 40 PVC for concrete encased duct bank runs.
4. Rigid steel for individual conduit runs direct buried in earth and duct banks.
5. Rigid steel for conduit runs embedded in structural concrete slabs.
6. EMT for interior area control wiring.

C. Coordination:

1. Conduit runs shown on the contract drawings are diagrammatic.
2. Coordinate conduit installation with piping, ductwork, lighting fixtures and other systems and equipment and locate so as to avoid any interference.

D. Related Sections:

1. Section 16000- Electrical

1.2 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified:

1. NEC Article 344, Rigid Metal Conduit.
2. NEC Article 352, Rigid Nonmetallic Conduit.
3. UL Standard No. 6, Rigid Metal Electrical Conduit.
4. UL Standard No. 514, Electrical Outlet Boxes and Fittings.
5. UL Standard No. 651, Schedule 40 and 80 PVC Conduit.
6. UL Standard No. 886, Electrical Outlet Boxes and Fittings for Use in Hazardous Locations.
7. UL Standard 1242, Intermediate Metallic Conduit.
8. ANSI C80.1, Specification for Zinc Coated Rigid Steel Conduit.
9. ANSI C80.4, Specification for Fittings for Rigid Metal Conduit and Electrical Metallic Tubing.

10. NEMA TC2, Electrical Plastic Tubing, Conduit and Fittings.
11. NEMA TC3, PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer's catalog cuts and technical information for the conduit, fittings and supports proposed for use.
2. Layout drawings showing proposed routing of exposed conduits, conduits embedded in structural concrete and conduits directly buried in earth. Drawings shall show locations of pull and junction boxes and all penetrations in walls and floor slabs.

B. Record Drawings: Include the actual routing of exposed and concealed conduit runs on record drawings.

PART 2 -PRODUCTS

2.1 MATERIALS

A. Rigid Steel Conduit, Elbows and Couplings:

1. All rigid galvanized conduit installed below grade or outdoors shall have all threads generously coated with Thomas & Betts "Kopr-Shield". In addition, all direct burial rigid galvanized conduit shall be thoroughly coated with Koppers bitumastic.
2. Material: Rigid, heavy wall, mild steel, hot dip galvanized, smooth interior, tapered threads and carefully reamed ends; 3/4-inch NPS minimum size.

3. Manufacturer: Provide rigid steel conduit and fittings of one of the following:
   a. Allied Tube and Conduit Corporation.
   b. Republic Steel Corporation.
   c. Triangle PWC Incorporated.
   d. Or equal.

B. PVC Coated Rigid Steel Conduit, Elbows and Couplings:

1. Material: Rigid, heavy wall, mild steel, hot dip galvanized, smooth interior, tapered threads, carefully reamed ends, 3/4-inch NPS minimum size with a factory coating of 40 mil thick polyvinyl chloride.
2. Color: Color of coating shall be the same on all conduit and fittings.
3. Manufacturer: Provide PVC coated rigid steel conduit and fittings of one of the following:
   a. Robroy Industries.
   b. Republic Steel Corporation.
   c. Or equal.

C. Intermediate Metallic Conduit, Elbows and Couplings:

1. Material: Rigid-type steel, work-hardened, hot-dip galvanized, smooth interior, tapered threads and carefully reamed ends; 3/4-inch NPS minimum size.
2. Couplings: Same as for rigid steel conduit.
3. Elbows: Factory formed of same material specification as for intermediate metallic conduit.
4. Manufacturers: Provide intermediate metallic conduit of one of the following:
   a. Allied Tube and Conduit Corporation.
   b. Republic Steel Corporation.
   c. Or equal.

D. Electric Metallic Tubing (EMT) Conduit, Elbows and Couplings

1. Material: Conduit fittings shall be cast type of nonferrous metal thoroughly coated inside and outside with metallic zinc or cadmium after all machining has been completed. Covers shall be of the same material as the fittings to which they are attached and shall be screwed on with rubber or neoprene gaskets between the covers and fittings.
2. Manufacturer: Provide EMT conduit and fittings as manufactured by one of the following
   a. Bethlehem Steel Corp.
   b. Youngstown Steel Corp.
   c. The U.S. Steel Corp.; Republic Steel Corp.
   d. Or equal.

E. PVC Conduit:

1. Material: Schedule 40 PVC plastic, NEMA Type EPC-40-PVD, 90°C rated, conforming to UL No. 651.
2. Manufacturer: Provide non-metallic conduit of one of the following:
   a. Amoco Chemicals Corporation.
   b. Carlon, Division of Indian Head, Incorporated.
   c. Or equal.
3. Non-metallic Fittings: Form elbows, bodies, terminations, expansions and fasteners of same material and manufacturer as base conduit. Provide cement by same manufacturer as base conduit.

F. Metallic Conduit Fittings and Outlet Boxes:

1. Material and Construction: Cast gray iron alloy, cast malleable iron bodies and covers. Outdoor units to be gasketed and watertight. Gaskets to be of an approved type designed for the purpose. Improvised gaskets are not acceptable. All units to be threaded type with five full threads. Material to conform to ANSI C80.4 and be listed by UL. Fittings and boxes on PVC coated conduit runs to have a factory-applied coating of 40 mil thick polyvinyl chloride. The use of "LB" fittings shall be avoided and type "LBD" fittings applied wherever the use of fittings is unavoidable.
2. Manufacturer: Provide metallic conduit fittings and outlet boxes of one of the following:
   a. Crouse-Hinds Company.
   b. Appleton Electric Company.
   c. Or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Exposed Conduit:

1. Install parallel or perpendicular to structural members or walls.
2. Wherever possible, run in groups. Provide galvanized conduit racks of suitable width, length and height and arranged to suit field conditions. Provide support at every ten feet minimum.
3. Install on structural members in protected locations.
4. Locate clear of interferences.
5. Maintain 12 inches from hot fluid lines and 1/4 inch from walls. Where it is impractical to maintain 12 inches of separation, the contractor shall insulate the source of high temperature as approved by the Engineer of Construction.
6. Install vertical runs plumb. Unsecured drop length not to exceed 12 feet.
7. Provide expansion fittings as required.

B. Conduit Embedded in Concrete:

1. Separation: Three times outer diameter of larger conduit center to Center.
2. Minimum Slab Thickness:
   a. With no crisscrossing of conduit, three times outer diameter of conduit.
   b. With crisscrossing of conduits, four times outer diameter of larger conduit.
3. Run conduit in center of slab.
4. Before concrete is placed, make the necessary location measurements of the conduit to be embedded so that the information is available to prepare record drawings.
5. Red indicating devise shall be installed above conduit or duct bank.

C. PVC Conduit:

1. Install in accordance with manufacturer's recommendations.
2. Join sections in accordance with manufacturer's installation procedures for push-fit, bell and spigot type joints, if applicable or with manufacturer's recommended cement.
3. During installation, provide expansion fittings for expansion and contraction to compensate for temperature variations. Expansion fittings shall be watertight and of the type suitable for direct burial.
4. Make transition to intermediate or rigid steel conduit before making turn up to enclosures.
5. Provide watertight expansion/deflection fittings at all wall and floor penetrations of all buildings and equipment concrete pads.

D. Underground Conduits:

1. Install individual underground conduits a minimum of *24* inches below grade unless otherwise indicated.

2. Perform all excavation, bedding, backfilling and surface restoration including pavement replacement where required.
3. Make conduit connections watertight.
4. Protect metallic conduits from corrosion by one of the following means:
   a. Provide three inches of concrete all around conduits.
   b. Tape conduits with an all-weather polyvinyl chloride plastic tape with a high tack adhesive formulated to resist corrosion, Scotchrap Brand 50 or equal.
   c. Apply 2 coats of a bitumastic coating.
5. Red indicating device shall be installed above conduit or duct bank.

E. Installation: Except as shown, the minimum size conduit permitted is 3/4 inch for exposed work and one inch for conduit encased in concrete or mortar.

F. All bolts and hardware for fastening, etc., shall be cadmium plated.

G. Conduits shall not contain the equivalent of four 90-degree bends without the use of a pull/junction box approved for the purpose and in accordance with National Electric Code.

H. All conduit extending through the floor behind panels or into control centers or similar equipment shall extend a minimum of six inches above the floor elevations, with no couplings at floor elevations.

I. Conduit installed in concrete or other masonry shall be so arranged that a minimum of three inches of covering is obtained. Spacing between conduits shall be sufficient to permit a complete filling with concrete or mortar without voids.

J. Conduits passing through sleeves in interior walls and floors shall be tightly sealed with an NFPA approved fire rated caulk.

K. Install in conformance with National Electrical Code (NFPA 70) requirements.

L. Supports:

1. Rigidly support conduits by clamps, hangers or Unistrut channels.
2. Support single conduits by means of one-hole pipe clamps in combination with one-screw back plates, to raise conduits from the support surface. Support multiple runs of conduits on trapeze type hangers with steel horizontal members and threaded hanger rods, Kindorff or equal. Rods shall be not less than 3/8-inch diameter, and shall be cadmium coated.
3. For PVC coated rigid steel conduit runs, supports and hardware shall be PVC coated or stainless steel.
4. Conduit and/or conduit fittings shall not be welded together or to any steel structure; however, conduit supports may be welded to flanges of steel beams, columns, etc., in accordance with approved welding techniques and practice.

M. Fastenings: Fasten raceway systems rigidly and neatly to supporting structures by the following methods:

1. To Wood: Wood screws.

2. To Hollow Masonry Units: Toggle bolts.
3. To Brick Masonry: Price expansion bolts, or equal.
4. To Concrete: Phillips, Hilti Corporation or equal anchors.
5. To Steel: Welded threaded studs, beam clamps or bolts with lockwashers or locknuts.

N. Empty Conduits:

1. Install nylon pull wire in each empty conduit and cap conduits not terminating in boxes with permanent fittings designed for the purpose.
2. Identify each empty conduit with a durable tag showing the conduit number indicated on the Drawings.

O. Field Bends: Factory bent elbows or field bent elbows with approved tools may be used. Heating of conduit to facilitate bending is prohibited with the exception of PVC conduit where nonstandard bends are required. No indentations are allowed. Diameter of conduit shall not vary more than 15 percent at any bend.

P. Joints:

1. Apply conductive compound to all joints before assembly.
2. Make up joints tight and ground thoroughly.
3. Use standard tapered pipe threads for conduit and fittings.
4. Cut conduit ends square and ream to prevent damage to wire and cable.
5. Use full threaded couplings. Split couplings not permitted.
6. Use strap wrenches and vises to install conduit. Replace conduit with wrench marks.
7. Apply zinc-rich paint to exposed threads and other areas of galvanized conduit system where the base metal is exposed.
8. Approved conduit expansion joints shall be provided wherever conduit crosses a structural expansion joint, is attached between two separate structures, and wherever the conduit run is 100 ft or more in a single straight length.

Q. Terminations:

1. Install insulated ground bushings on conduits entering boxes or cabinets, except threaded hub types.
2. Provide locknuts on both inside and outside of enclosure for grounding.
3. Bushings not to be used in lieu of locknuts.
4. Connections from rigid conduit to motors, limit switches, solenoid valves, level controls, etc., shall be made with short lengths of liquid-tight flexible neoprene jacketed metal conduit. These lengths shall be provided with appropriate connectors with devices which will provide an excellent electrical connection between equipment and the rigid conduit for the flow of ground current.

R. Moisture Protection:

1. Plug or cap conduit ends at time of installation to prevent entrance of moisture or foreign materials.
2. Make underground and embedded conduit connections watertight.

3. Thruwall Seals: Install for conduits passing through new exterior subsurface walls or base slabs of buildings and for conduits passing through existing exterior walls. For individual exposed conduits passing through interior walls, install non-metallic sleeves to protect the conduit against action of alkaline substances, which may be present.
4. Drainage: Pay particular attention to drainage for conduit runs. Wherever possible, install conduit runs so as to drain to one end and away from buildings. Avoid pockets or depressions in conduit runs.

S. Corrosion Protection:

1. Conduit Curb:
   a. In concrete slabs or floors, provide a two inch high curb extending two inches from the outer surface of the conduit penetrating the floor, to prevent corrosion.
   b. Terminate conduit stub-ups in couplings, slightly above the finished concrete curb.
   c. Paint the stub-up with Scotch-Clad Protective Coating #1706 or equal a minimum of 6 inches above and below the finished surface of the concrete.
2. Dissimilar Metals:
   a. Take every action to prevent the occurrence of electrolytic action between dissimilar metals.
   b. Do not use copper products in connection with aluminum work, and do not use aluminum in locations subject to drainage of copper compounds on the bare aluminum.
   c. Back paint aluminum in contact with masonry or concrete with two coats of aluminum-pigmented bituminous paint.
3. PVC Coating: Field apply a 40 mil thick polyvinyl chloride coating to supports and fasteners for PVC coated conduit runs.

T. Reused Existing Conduits and New Conduit Installations:

1. Pull rag swab through conduits to remove water and to clean conduit prior to installing new cable.
2. Repeat swabbing until all foreign material is removed.
3. Pull mandrel through conduit, if necessary, to remove obstructions.

U. Core drill for individual conduits passing through existing concrete slabs. Obtain authorization from OWNER prior to core drilling. Seal spaces around conduit with epoxy grout. All cutting, channeling and drilling of holes through walls, floors, foundations, and ceilings, required for the correct installation of the electrical work, shall be done by and repaired by the Contractor. The cost of cutting and patching shall be included in the bid. All work shall be finish painted (prime coat and two (2) finish coats) to match the existing finishes. All incidental damage to existing wall, structures etc. shall be refinished to the satisfaction of the owner representative.

V. The cutting of walls or floors for conduit shall be kept to a minimum. Where such cutting is absolutely necessary care shall be taken so as not to weaken the walls or floor involved. Beams or other structural supports shall not be cut under any condition, except as approved in writing by the Engineer of Construction.

3.2 TESTING

A. Test conduits by pulling through each conduit a cylindrical mandrel not less than two pipe inside diameters long, having an outside diameter equal to 90 percent of the inside diameter of the conduit.

3.3 IDENTIFICATION

A. Tag all conduits at the ends and in all intermediate boxes, chambers, handholes and other enclosures. Fasten tags to conduits with No. 14 AWG insulated copper wire. Where this method is not practical, fasten to the adjacent masonry by means of expansion bolts.

END OF SECTION 16111

SECTION 16120 - WIRES AND CABLES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Under this Section, the Contractor shall furnish and install all wires and cables for power, controls and communication as required to complete the electrical installation.

B. Each coil or reel of insulated wire and cable furnished shall bear a tag, containing the UL approval stamp (providing cable is of the class inspected by the said laboratory), name of manufacturer, trade designation, month and year of manufacturer; and in no case shall be more than six months old unless accepted by the ENGINEER. Cable "mil ends" shall be unacceptable for use on this project. Wire and cable shall not have been stored in the weather outdoors.

C. Conductors larger than No. 10 AWG shall be stranded and all conductors shall be copper, unless otherwise specified.

D. The following information for each size of wire and cable shall be submitted to the ENGINEER for acceptance:

1. Voltage rating
2. Name of cable manufacturer
3. Minimum insulation resistance in megohms, per 1,000 ft at 15.5° C
4. Number and size of strands in each conductor
5. Conductor insulation in mils
6. Sheath thickness in mils
7. Average OD of bare conductor
8. Average overall diameter of finished cable
9. Weight per 1,000 ft of finished cable
10. Application or intended use
11. Conductor type

E. Cable shall be shop tested in accordance with the latest standards and applicable test procedures of the Specifications of the ICEA and certified data shall be submitted in compliance with this requirement. Sample lengths of cable shall be submitted to the ENGINEER.

F. Each wire and cable shall be individually identified and tagged with a unique number using wire markers at each termination, splice point, and where passing through junction boxes or pull boxes (even when not spliced).

PART 2 - PRODUCTS

2. 1 600 VOLT AND BELOW POWER CABLES

A. Single Conductor Cable. These cables shall be composed of stranded tinned copper conductors insulated with a heat, flame, and moisture resistant thermoplastic compound. Cables shall be rated not less than 600 volt, and shall be for circuits operating in dry and wet locations at a maximum conductor temperature of 90° C. Cables shall be UL listed as type THHN cable.

B. The conductors shall be stranded annealed copper, the individual strands of which shall, before stranding, be in accordance with ASTM: B 3.

C. The stranded conductors shall conform to ASTM: B 8, Class B.

D. The conductors shall be insulated with a properly vulcanized flame-retardant, insulating compound.

E. The minimum average thickness of the insulation shall conform to the requirements of Table A. The insulation shall be circular in cross-section and so centered that the minimum wall thickness shall be not less than the minimum average thickness shown in Table A.

TABLE A

Size of Conductor	Insulation	Thickness
Cable Type	AWG & MCM	mils
Single Conductor	14 to 12	15
THHN 90 C	10	20
	8 to 6	30
	4 to 2	40
	#1 to 4/0	50
	250 to 500	60
	501 to 1000	70

F. Conductor insulation or phase-coded tapes shall be color-coded as follows:

AC Power 460 Volt and Above
Phase A - YELLOW
Phase B - BROWN
Phase C - ORANGE
Neutral - GREY

208/120 Volt System
Phase A - BLACK
Phase B - RED
Phase C - BLUE
Neutral - WHITE

120 Volt Control Wiring
Single conductor ac control wire shall be RED except a wire entering a Motor Control Center compartment or control panel which is an interlock, shall be color-coded YELLOW.

24 Volt Control Wiring - ORANGE

Equipment Ground – GREEN

G. Single conductor ac control wires shall be multicolored whenever group is installed in same conduit or terminated in same panelboard, cabinet, junction box, etc. Control wiring intended for installation in plenums shall be so rated.

PART 3 - EXECUTION

3.1 600 VOLT AND BELOW POWER CABLES

A. Cable Ampere Rating: The sizes of wire and cable for individual circuits shall be shown on drawings or as acceptable to the ENGINEER as being proper for the service requirements. Wires for branch circuits shall not be smaller than No # 12 AWG. Wires of greater size, as indicated or required, shall be used to minimize voltage drops where circuit runs are exceptionally long.

B. Wire Terminals: Wires on manufactured assemblies such as distribution board, motor control centers and individual motor control equipment shall be terminated with cup terminals, pronged washers, compression type or pressure type terminals furnished on devices. Set-screw type pressure connectors shall be provided with saddles.

C. Wires and cables installed shall be terminated with pressure tool applied solderless connections. For wires 250 MCM and larger, the lugs shall have long barrels to allow double indentations.

D. All 600 volt cables shall have the minimum possible number of splices and splices shall only be made in junction boxes. All wire splices shall be identified using wire markers.

E. The finished splice shall be made waterproof via the application of an epoxy coating manufactured for the purpose.

F. Sealing of Conduits. Where cables enter pullboxes, switchgear enclosures or incoming line sections from the underground system, conduit ends shall be sealed with oakum packing and plastic, rat repellent sealing compound in addition to the OZ Type "CSBG" fittings and all spare conduits shall be capped. Unused conduit and duct entrances shall be closed off by spring clip attached, galvanized, sheet steel covers.

G. Sealing of Conduits: Where cables enter pull boxes, junction boxes, HVAC enclosures or incoming feeders from the underground system, conduit ends shall be sealed with OZ

Type "CSBG" fittings and all spare conduits shall be capped with cast screw covers and made waterproof.

H. Phasing/Rotation. All wiring to motors, automatic transfer switch, motor control centers, panelboards, etc. shall be phase coordinated with existing power where applicable and coordinated with rotational requirements of equipment. Where phasing or rotation is incorrect, contractor shall change connections to obtain proper results and retape termination at no additional cost to owner.

I. Cables and wires shall be installed continuous from power source or pickup point to load or destination without unnecessary splices. Pullboxes shall be installed judiciously, as required by code, or to avoid tension due to the length of pull.

3.2 PULLING TEMPERATURE

A. Cable shall not be flexed or pulled when the temperature of the insulation or of the jacket is such that damage will occur due to low temperature embrittlement. When cable will be pulled with an ambient temperature within a three day period prior to pulling is 40 deg F or lower, cable reels shall be stored during the three day period prior to pulling in a protected storage with an ambient temperature not lower than 55 deg F and pulling shall be completed during the work day for which the cable is removed from the protected storage.

B. All feeder and underground conduits shall be swabbed with a brush, followed by clean rags, then a mandril (85% of conduit diameter), before pulling cables through. A lubricating compound shall be applied to the cables to reduce friction and damage to the cables during the pulling operation.

3.3 TESTING

A. Testing. All wiring shall be continuity tested, meggered, to ensure the integrity of the insulation. A type written report shall be submitted to the Engineer containing all the test results. All wire/cable failing test or judged by the engineer as being deficient, shall be replaced.

END OF SECTION 16120

SECTION 16520 - LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Exterior luminaires with lamps
2. Interior luminaires with lamps
3. Remote-mounted control and timer.
4. Alternate “A”: New exterior and interior lighting at shed.

1.3 SUBMITTALS

A. Product Data: For each luminaire, arranged in the order of lighting unit designation. Include data on features, accessories, finishes.

B. Shop Drawings: Anchor-bolt templates keyed to specific poles and certified by manufacturer.

1. Include wiring diagrams, circuiting and panel connection information, and conduit and branch wiring routing information..

C. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with IEEE C2, "National Electrical Safety Code."

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

2.2 EXTERIOR LUMINAIRES

A. Exterior Luminaire Type "A": Pole-mounted 22" arm-mounted floodlight. Fully enclosed and gasketed. UL listed for wet location.

1. Manufacturer: Cooper Lighting, Peachtree City, GA
2. Model: Streetworks # TRU15PPW3SBK4 – TR/VS – MA1222
3. Pole: Round Straight Aluminum Pole: Streetworks # RSA5T15NYM1
4. Lamps: (1) 150W MH

B. Exterior Luminaire Type "B": Existing to remain. See Type "E".

C. Exterior Luminaire Type "C": Stem mounted die-cast aluminum Bell fixture. UL listed for wet location.

1. Manufacturer: KIM Lighting, City of Industry, CA
2. Model: KIM #KLV162 BL. Black finish.
3. Lamps: 5W LED. Color "halogen white", approx 3500K. Includes driver.
4. Mount: KIM #KLV400LB.Spear mount, black. Install in 12" dia x 12" deep concrete.

D. Exterior Luminaire Type "D": Ground-mounted die-cast aluminum Bullet fixture UL listed for wet location.

1. Manufacturer: KIM Lighting, City of Industry, CA
2. Model: KIM #6220D / 70PMH120 / BL. Direct Mount, Black finish
3. Lamps: 70W, 120V Pulse Start Metal Halide Par 38 lamp. Medium Base.
4. Options: KIM #DS220. Stainless Steel Debris Screen welded to flange.

E. Exterior Luminaire Type "E": Building-mounted LED floodlight to match existing Type "B". Connect to exterior light controls.

1. Manufacturer: KIM Lighting, City of Industry, CA
2. Model: KIM #CFL1-27L3KUV-DB. Dark bronze finish.

3. Lamps: 50W LED.
4. Mount: KIM #JW/DB. Architectural wall mount for vertical and horizontal application, dark bronze.

F. Alternate "A": Exterior Luminaire Type "F": Wall-mounted gooseneck light fixture. UL listed for wet location.

1. Manufacturer: LSI Authentic Abolite Lighting, Carrollton, TX
2. Model: Abolite RLM series # RD150 / 50W MH / 120V / GBK / LDS96WL / PG3
3. Lamps: 50W MH
4. Gooseneck Wall Bracket: Abolite # GB A 3 GWT with wall plate. Color: gloss black to match fixture.

G. Alternate"A": Interior Light Fixture Type "G": Chain-mounted utility fixture. UL listed for wet location.

1. Manufacturer: Philips Lightolier, Fall River, MA
2. Model: Lightolier Turret Series Industrial Fluorescent #TU-4-A-2-32-UNV-HI
3. Lamps: T8
4. Mount: Chain Hanger Kit #LFL-123 with 4' Wire Guard #LFL-173

H. Flag Pole Light Type "H": Pole-mounted light fixture for flagpole.

1. Manufacturer: Magniflood, North Amityville, NY
2. Model: Bayville Post Light #L4M-250-L-PC-ACRY-T5-SIL, silver satin finish.
3. Lamps: 250w metal halide 120V, Type V lens with photo eye
4. Pole Top Adapter: MF2764-04-SIL.

2.3 CONTROL AND TIMER

A. UL-listed, mounted remote from luminaires at location near house basement panel identified by owner and architect.

B. Digital control and timer with photo-electric and manual preset on/off operation. Timer shall activate lights at dusk, with ability to deactivate lights at any preset time, or dawn. Control and timer system shall permit two circuits to be activated and deactivated independently.

Circuit #1: Exterior Luminaire Type "A" fixtures only.
Circuit #2: Exterior Luminaire Type "B", "C", "D", and "F"

PART 3 - EXECUTION

3.1 INSTALLATION

A. Identify circuiting requirements and connections to existing panel. Confirm requirements and connections with Architect and Owner.

B. Install or wiring and conduit as required for luminaire operation. Run conduit in concealed or non-obtrusive manner. Verify conduit run locations with Architect.

C. Install lamps in each fixture.

D. Luminaire Attachment: Fasten to indicated structural supports.

E. Adjust luminaires that require field adjustment or aiming.

END OF SECTION 16520

SECTION 16720 – TELEPHONE ENTRY SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Telephone entry systems including but not limited to the following:

1. Telephone entry control devices.
2. Application software.

1.2 RELATED SECTIONS

A. Section 05730 – Decorative Metal Fences and Gates.

B. Section 16000 – Electrical.

1.3 REFERENCES

A. NFPA 70 – National Electrical Code.

B. FCC Regulations – Part 68.

1.4 REGULATORY REQUIREMENTS

A. System shall be UL-Listed.

1.5 SUBMITTALS

A. Submit under provisions of Section 01340.

B. Manufacturer's Data: Submit copies of the following:

1. Product Data Sheets.
2. Installation Instructions.
3. Authorized Dealer Certificate and Certified Training Certificates of installers who will be working on this project.

C. Shop Drawings: Submit the following:

1. Access system layout and locations, including size requirements.
2. Detailed wiring diagrams of access equipment.
3. Load calculations of all equipment for proper sizing of electrical provided by the customer and standby emergency generator circuits.

D. As-Built Drawings: Update Shop Drawings to create final As-Built Drawings. Submit three (3) copies and digitally in AutoCAD 2010 on CD (3 copies).

E. Operation Data: Include three (3) copies of the software Administrator and Operator Manuals.

F. Maintenance Data: Include maintenance and repair procedures.

1.6 QUALITY ASSURANCE

A. Manufacturer: The telephone entry control system shall be from a single-source manufacturer that specializes in telephone entry control systems with a minimum of 5 years experience.

B. Installer: Company specializing in telephone entry control systems with a minimumof three years experience on systems of similar size and scope. Technicians working on project must have been certified on the hardware and software used for this project.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Owner will provide, on-site, a secure, dry, locked storage area for all equipment delivered under this scope of work.

B. Store products in manufacturer's unopened packaging until ready for installation.

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

1.8 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.

PART 2 - PRODUCTS

2.1 TELEPHONE ENTRY SYSTEMS

A. Basis of Design: Chamberlain Elite EL25, 6" high x 10-1/4" wide x 4" deep, as manufactured by The Chamberlain Group, or approved equal.

2. Power: 12 VAC.

3. Baluns: Cat5 to Coaxial Cable converters, quantity: 2

4. LiftMaster Passport Stand Alone Proximity Card Reader, Model #PPLX, 4.5"H x 3.2" W

6. LiftMaster Wiegand Module, Model #WOMODKT

7. Camera: Integrate camera into system to provide live video directly to monitor screen. Model # EL25DVRCAMKT

8. Monitor: 12” LCD color screen.

9. Cards: clam shell type, quantity: 25

10. Lockable Steel Enclosure: 14” x 8” x 5”, vandal resistant.
    a. Color: Black
    b. Mount: 42”ht. gooseneck pedestal.

11. Warranty: One year.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 INSTALLATION

A. Install system in accordance with manufacturer’s instructions.

B. Install wiring for detection and signal circuit conductors in conduit. Use 22 AWG minimum size conductors.

C. Make conduit and wiring connections to existing door hardware devices as required.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Repair or replace damaged products before Substantial Completion.

END OF SECTION 16720

BID PROPOSAL

CITY OF JERSEY CITY
DEPARTMENT OF ADMINISTRATION
DIVISION OF ARCHITECTURE, ENGINEERING,
TRAFFIC AND TRANSPORTATION
Date _____
Project No.____2010-029__

DO NOT REMOVE THESE PROPOSAL PAGES. SUBMIT THE ENTIRE BOUND DOCUMENT IN A SEALED ENVELOPE MARKED ON BOTH SIDES WITH THE PROJECT TITLE. **ALSO SUBMIT SEPARATE COPY OF COMPLETED BID PROPOSAL WITH BID PACKAGE.**

Proposal of _____ (hereinafter called "Bidder" organized and existing under the laws of the State of _____ doing business as _____*

Gentlemen:

The Bidder, in compliance with your invitation for bids for the:

APPLE TREE HOUSE - PHASE III - SITE IMPROVEMENTS

JERSEY CITY, N.J.

having examined the plans and specifications with related documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials, and supplies, and to construct the project in accordance with the Contract Documents; within the time set forth therein, and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents of which this proposal is part.

Bidder hereby agrees to commence work under this contract on or before a date to be specified in written "Notice to Proceed" of the City and to fully complete the project within ____210___ consecutive calendar days thereafter as stipulated in the specifications**.** Furthermore, it is understood and agreed in accordance with Article GC-36 "Time for Completion, Liquidated Damages and Extension of Time," that liquidated damages in the amount set forth in Article GC-36 will be charged to the Bidder for each consecutive calendar day of delay until the work is completed and accepted.

Bidder acknowledges receipt of the following addendum:

Addendum No. _____ Dated:_____

Addendum No. _____ Dated:_____

Addendum No. _____ Dated:_____

*Insert “a corporation, “a partnership”, or “an individual” as applicable.

BID PROPOSAL CHECK LIST

The following documents are to be completed and submitted with the bid proposal. Compliance shall be indicated by placing initials on the line preceding each item attached:

____ *List of Prices

_____ *Grand Total Bid Price

_____Alternate(s), if applicable, with supporting documentation, if applicable.

_____ Substitutions, if applicable, are attached in conformance with the Information to Bidders, Article 21, Substitutions

_____ *Certificate of Experience of General Contractor

_____Certificate of Experience for subcontractors required to be named pursuant to N.J.S.A. 40A:11-16

_____*Plant and Equipment Questionnaire completed by General Contractor

_____Plant and Equipment Questionnaire completed by subcontractors required to be named pursuant to N.J.S.A. 40A:11-16

____ Non-Collusion Affidavit

_____*Corporation or Partnership Statement

____ Form MWB-3 - Minority/Women Business Compliance Plan (3 Forms)

_____Exhibit B: Mandatory Equal Employment Opportunity Language (N.J.S.A. 10.5-31 et seq.) (N.J.A.C. 17:27) Construction Contracts **must be signed**.

____ State of New Jersey, Division of Contract Compliance Equal Employment Opportunity in Public Contracts' Initial Project Workforce Report Construction (Form AA-201). **Must be submitted after notification of award but prior to signing a construction contract.** Form AA-201 maybe obtained and must be submitted to Jersey City's Public Agency Compliance Officer (P.A.C.O.) at Office of EEO/AA, 280 Grove Street, Room - 103, Jersey City, NJ 07302, Telephone 201-547-4533 and Fax 201-547-5088.

_____*Bid Bond

_____*Consent of Surety

____ Public Works Contractor Registration Certificates for General Contractor and all Subcontractors listed on page **P-11**.

_____New Jersey Business Registration Certificates of General Contractor and all Subcontractors listed on page **P-11**.

___ *Written acknowledgment of addendum (if issued), on Page P-1 of the Bid Form, pursuant to N.J.S.A. 40A:11-23.2(e).

Failure to include the bid documents listed immediately above that are marked with an asterisk (*) shall result in automatic rejection of the bid at the time of the bid reception.

TOTAL BASE BID PRICE:

Item No. 1: The Bidder agrees to perform and provide all labor, materials, equipment and services required to complete all work as described in the Specifications and shown on the Drawings for the Lump Sum Price of:

_____
(In Writing)

_____
(In Figures)

UNIT PRICES:

The Specifications and Drawings represent the Base Bid, and contain specific quantities of work based on good faith estimates. If during project construction, the quantities contained in the specifications and drawings are exceeded, payment for excess quantities shall be based on the prices set forth below:

Item No. 2: Unforeseen excavation and replacement with engineered fill in accordance with Section 02300 - Earthwork

100 C.Y. @ $_____ Per C.Y. for a Total Cost of $_____
(Unit Price in Figures) (Total Cost Item 2 in Figures)

_____ Per C.Y. _____
(Write Unit Price) (Write Total Cost - Item 2)

Item No. 3: Rock removal in accordance with Section 02300 - Earthwork. Removal shall be based on line drilling method.

75 C.Y. @ $_____ Per C.Y. for a total cost of $_____
(Unit Price) (Total Cost Item 3 in Figures)

_____ Per C.Y. _____
(Write Unit Price) (Write Total Cost - Item 3)

The Unit Price bid shall cover all costs of whatever nature, incidental to that item. In explanation but not in limitation thereof, these costs shall include the cost of all work, labor, material, equipment, transportation and all else necessary to execute the Contract, and all incidental expenses in connection therewith, including all costs on account of less by damage or destruction encountered for settlement of damages, and including all cost for replacement of defective materials.

The Estimate of material quantities specified is approximate only and is given solely to be used as a uniform basis for comparison of basis. The minimum quantity for any item shall be zero (0). The maximum quantity shall be as stated in the Bid Proposal for each item.

Should the final quantity be less than the maximum quantity stated in the Bid Proposal for any item, the Supplier shall have no claim for loss incurred by him/her for commitments made by him/her in anticipation of the work contemplated, or for loss of anticipated profits, or for work done prior to his/her having been authorized to proceed therewith.

GRAND TOTAL BID PRICE: (Item 1 - 3 above)

_____

(In Writing)

_____

(In Figures)

The Contract will be awarded based on the Grand Total Bid Price. However, it is understood that the Total Cost for quantities are based upon a good faith estimate of the quantity of materials needed; therefore, the actual contract price, which cannot be determined until the completion of the project may be a sum either greater than or less than the Grand Total Bid Price above in accordance with the above Unit Price(s).

ALTERNATES:

Indicate below the amount that will be added to or deducted from the lump sum base bid for each of the following alternates, if any are accepted by the City:

ALTERNATE #A:

(**Add** ☐ or **Deduct** ☐) please indicate with check mark

ALTERNATE #A: PROVIDE NEW HISTORICALLY APPROPRIATE OUTBUILDING WITH ANY APPURTENANCE AS INDICATED ON THE DRAWINGS AND WITHIN THE SPECIFICATIONS.

Under the Base Bid: Provide new topsoil, grading and plantings as per drawings and specifications without outbuilding.

Under this Alternate: Provide and install new outbuilding as indicated on the drawings and within the specifications. Refer to Drawings A-1, A-2, CE-101, CE-105, L-1 and project specifications for information.

Additional calendar days added to the contract time period: 60

_____
(In Writing)

_____
(In Figures)

PROCEDURE FOR ALTERNATE BIDS

Each bidder shall submit on the Proposal Form, Alternate Bids stating the difference in price, additions to or deductions from the Grand Total Bid Price for the substitution, omission, or addition of the following materials, items or construction from that shown and specified.

Each Bidder shall carefully check the Drawings and Specifications to determine the extent of each Alternate Bid required.

Alternate Bids shall include all overhead and profit applicable thereto.

Alternate Bids shall reflect the increase or decrease in cost of all work of every name and nature which may be affected thereby and not subsequent claims for extras by reason of the Contractor's failure to observe this requirement will be considered.

Except as otherwise described or approved, materials and workmanship of the Alternate Bids shall conform to the requirements specified under the various Sections of the Specifications for similar items of work.

Where methods of construction, materials, finishes or details of installation required by the various Alternate Bids differ from the requirements shown on drawings or specified for corresponding items, the Alternate construction, material, etc., will be subject to approval by the Architect.

The Contractor shall submit shop drawings and samples for the work under each accepted Alternate Bid for approval in conformance with general conditions.

SCHEDULE OF PRICE
(FOR ALTERNATE)

Grand Total Bid Price plus Alternate #A

_____
(In Writing)

_____
(In Figures)

NOTE: If the Grand Total Bid Price is within the amount of funds available to finance the Contract and the City wishes to accept Bids on the Alternate(s), then the Contract award will be made to that responsible Bidder submitting the lowest combined Bid, consisting of the Grand Total Bid Price plus Alternate Bid(s) (applied in the alphabetical order in which they are listed in the Schedule of Prices). Under this procedure, if the City wishes to award on only the Grand Total Bid Price, then the Contract will be awarded to that responsible Bidder submitting the lowest Grand Total Bid Price.

It is understood and agreed that the total price stated by the undersigned in the "Schedule of Prices" is based on estimated quantities and will only control in the awarding of the contract. It is further understood that the quantities stated in the "Schedule of Prices" for the items are estimated only and may be increased or decreased as provided in the specifications.

Attached herewith is a (cashier's check) (certified check) (bid bond) (Check one)

in the amount of $_____ representing 10% of the total amount bid, but not exceeding $20,000.00 as stated in Article 8, Page 4.

The undersigned agrees that this check or bond is to be forfeited as liquidated damages and not as a penalty, if the contract is awarded to the undersigned and he shall fail to execute the contract for the project or forward the bond required within the stipulated time. Otherwise, the check or bond will be returned to the undersigned.

Choice of Retainage:

If the Total Price bid for the Contract Work exceed $100,000. the undersigned elects the following option for retainage in accordance with the General Conditions: (check one only)

2% Cash from each payment
2% of Contract amount deposited as approved negotiable securities

The undersigned is (an individual) (a corporation) (a partnership) under the laws

of the State of _____ having offices at _____.

Signed _____

Name _____

Title _____

Company _____

Address _____

_____

Phone (___)_____
Fax (___)_____

(Seal if Bid is by a Corporation)

1. CERTIFICATE OF EXPERIENCE

_____hereby certifies that _____has performed the following work within the past three (3) years:

Name of Owner	Amount of Contract	Type of Work	Owner's Representative in charge of Work (Inc. Address and Phone)	Approximate Dates

_____
Name of Bidder

_____
By

_____
Witness

_____
Title

_____

IMPORTANT: THIS FORM MUST BE FILLED IN BY BIDDER.

2. PLANT AND EQUIPMENT QUESTIONNAIRE

Submitted to City of Jersey City

By _____ A Corporation
A Co-partnership
An Individual

Principal Office _____

The signatory of this questionnaire guarantees the truth and accuracy of all statements and of all answers to interrogatories hereinafter made.

a. In what manner have you inspected the proposed work? Explain in detail.

_____
_____
_____

b. Explain your plan or layout for performing the proposed work.

_____
_____
_____

c. The work, if awarded to you, will have the personal supervision of whom?

_____
_____
_____

d. Do you intend to do the grading on the proposed work with your own forces? _____ If so, give type of equipment to be used.

_____
_____
_____

e. Do you intend to sublet any portions of the work? _____
If so, it is mandatory pursuant to N.J.S.A. 40A:11-16 that you list the names of those subcontractors under each discipline below, failure to do so will automatically result in rejection of the bid.

Trade	Name of Subcontractor	Address
Plumbing and Gas Fitting and all kindred work	Not Applicable to this project	_____
Steam Power Plants, Steam and Hot Water Heating and Ventilating and Refrigeration Apparatus and all kindred work	Not Applicable to this project	_____
Electrical Work, including any Electrical Power Plants, Tele-data, Fire Alarm, or Security System	_____	_____
Structural Steel and Ornamental Iron Work	_____	_____

Each subcontractor listed above shall fill out and submit a Certificate of Experience (as shown in this Bid Proposal) and items a, b, c, f, g, h, I and the remaining affidavit, duly executed, on the last page of the "Plant and Equipment Questionnaire". The General Contractor shall supply each subcontractor with duplicate pages of this proposal to be filled out by the subcontractor and then submitted with the bid proposal.

Whenever a bid sets forth more than one subcontractor for any of the specialty trade categories listed above, the bidder shall submit to the contracting unit a certificate signed by the bidder listing each subcontractor named in the bid for that category. The certificate shall set forth the scope of work for which the subcontractor has submitted a price quote and which the bidder has agreed to award to each subcontractor should the bidder be awarded the contract. The certificate shall be submitted to the contracting unit simultaneously with the list of the subcontractors. The certificate may take the form of a single certificate listing all subcontractors or, alternatively, a separate certificate may be submitted for each subcontractor. If a bidder does not submit a certificate or certificates to the contracting unit, the contracting unit shall award the contract to the next lowest responsible bidder.

F.Give full information about all of your contracts, whether private or government contacts, whether prime of sub-contracts; whether in progress or awarded but not yet begun; or where you are low bidder pending formal award of contract.

OWNER	LOCATION	DESCRIPTION	ADJUSTED CONTRACT AMOUNT	AMOUNT COMPLETED AND BILLED	BALANCE TO BE COMPLETED	ESTIMATED DATE OF COMPLETION
		TOTALS				

g. What equipment do you own that is available for and intended to be used on the proposed project?

QTY	ITEM	DESCRIPTION, SIZE, CAPACITY, ETC.	COND.	YRS. OF SERVICE	PRESENT LOCATION

h. What equipment do you intend to purchase or lease for use on the proposed project?

QUANTITY	ITEM	DESCRIPTION, SIZE, CAPACITY, ETC	APPROXIMATE COST	
			PURCHASE	LEASE

I. Have you made contracts or received firm offers for all materials within prices used in preparing your proposal? Do not give name of dealers or manufacturers.

_____

_____

_____

The undersigned hereby declare(s) _____ that the items of equipment in Table 1 are owned by _____, and are available for and intended to be used on the Project, if _____ awarded the Contract, and that he/they propose(s) to purchase or lease for the Project the additional items of equipment stated in Table 2.

Dated at _____ this _____

day of _____, 20_____

_____
Name of Organization

By _____

_____
Title of Person Signing

STATE OF _____
ss:
COUNTY OF _____

_____, Being duly sworn, deposes and says that he is
_____ of the above_____
Name of Organization

and that the answers to the foregoing questions and all statements therein contained are true and correct.

Sworn to before me this _____

day of _____, 20_____

_____
Notary Public

My commission expires _____

PROJECT TITLE: APPLE TREE HOUSE - PHASE III - SITE IMPROVEMENTS

3. NON-COLLUSION AFFIDAVIT

STATE OF NEW JERSEY)
ss:
COUNTY OF HUDSON)

I, _____ of the City of_____, in the County of _____ and the State of _____, of full age, being duly sworn according to law, upon my oath depose and say that:

I am _____ of the firm of _____ the bidder making the Proposal for the above named project and that I executed the said Proposal with full authority so to do; that said bidder has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free, competitive bidding in connection with the above named project; and that all statements contained in said Proposal and in this affidavit are true and correct, and made with full knowledge that the City of Jersey City relies upon the truth of the statements contained in said Proposal and in the statements contained in this affidavit in awarding the contract for the said project.

I further warrant that no person or selling agency has been employed or retained to solicit or secure such contract upon an agreement or understanding for a commission, percentage, brokerage or contingent fee, except bona fide employees or bona fide established commercial or selling agencies maintained by:

_____
(Name of Contractor

_____
(Also type or print name of affiant
under signature)

ATTEST:

_____
Secretary

(Affix Corporate Seal)

Sworn and subscribed to before me
this day of , 20

_____
NOTARY PUBLIC
My commission expires on:_____

CITY OF JERSEY CITY

COUNTY OF HUDSON

STATE OF NEW JERSEY

4. CORPORATION OR PARTNERSHIP STATEMENT

Chapter 33 of the Public Laws of 1977 provides that no corporation or partnership shall be awarded any State, County, Municipal or School Districts contract for purposes of any work or the furnishing of any materials or supplies unless prior to the receipt of the bid or accompanying the bid of said corporation or partnership there is submitted a statement. The statement shall set forth the names and addresses of all stockholders in the corporation or partnership who own ten (10) percent of its stock of any class or of all individual partners in the partnership who own a ten (10) percent or greater interest therein.

Date:_____ 20_____

Legal Name of Bidder: _____

Incorporated _____ Partnership _____

Business Address:
Street _____
City _____
State & Zip Code _____
Telephone _____

Listed below are the names and addresses of all stockholders in the corporation or partnership who own ten (10) percent or more of its stock of any class, or of all individual partners in the partnership who own a ten (10) percent or greater interest therein.

Name: _____ Address: _____

Name: _____ Address: _____

Name: _____ Address: _____

Name: _____ Address: _____

We have no one person who owns ten (10) percent or more of the corporation or partnership.

Signed: _____

Title: _____

If extra space is required, add sheets as necessary.

1/2015

EQUAL EMPLOYMENT OPPORTUNITY (EEO)/ AFFIRMATIVE ACTION (AA) REQUIREMENTS

FOR CONSTRUCTION CONTRACTS

Questions in reference to EEO/AA requirements for Construction Contracts should be directed to:

Jeana F. Abuan
EEO/AA Officer, P.A.C.O.
Department of Administration
Office of EEO/AA
280 Grove Street Room-103
Jersey City NJ 07302
Tel. # 201-547-4533
Fax# 201-547-5088
E-Mail Address: abuanj@jcnj.org

Rev. 02/10/12

Minority/Women Business Participation
In City Construction Contracts
City of Jersey City
Department of Administration
Office of Equal Opportunity/Affirmative Action

I Policy

The City of Jersey City has a policy of equal opportunity and nondiscrimination in public contracting based on race, national origin or gender. Further, the City's policy is to encourage increased participation of minority owned businesses in city contracts. This is in accordance with N.J.S.A. 10:5-32, which provides that public works contracts shall provide for equality in opportunity by any contractor engaged in a public works project.

The City has determined that a "responsible" bidder does not engage in unlawful race or gender discrimination in its awarding of subcontracts or the purchase of supplies used in construction, and does make reasonable efforts to solicit and award subcontracts to minority and female businesses.

II Purpose

The city has adopted regulations to assure that bidders receiving City Constructions are not engaged in unlawful discrimination and make reasonable good faith to include persons of color and women owned businesses as subcontractors. The intent and purpose of these procedures is not to require that a specific proportion of every contract be allocated to minority and women owned businesses, but to assure that they are included in the competitive process and have opportunities to participate in the city's publicly contracted projects. Pursuant to this policy, contractor is expected to include minority/women owned businesses in all formal or informal invitations to quote, etc, and to make every reasonable effort to provide subcontracting opportunities to qualified minority and women owned businesses.

The purpose of the "participation levels" referred to herein is to help the city determine whether the contractor has met the requirements of nondiscrimination and of good faith efforts to make subcontracting opportunities available to minority and woman owned businesses. These regulations presume that contractors who have attained or exceeded the suggested participation levels for minority and female subcontractor participation on particular City construction contracts are not engaging in unlawful sex or racial discrimination and have engaged in reasonable efforts to involve minority and female subcontractors. A contractor who is unable to attain or exceed such levels may have its subcontracting practices examined by the city to determine if it is engaging in unlawful discrimination in subcontracting practices or has failed to engage in reasonable outreach efforts.

III Suggested participation level for minority and women owned subcontractors:

A. Suggested levels of participation for minority owned subcontractors and women owned subcontractors are determined based on estimates of the dollar value of the work in the various disciplines which may be subcontracted and the availability of minority and woman owned prospective subcontractors in the applicable work areas as reflected in the "SAVI II" database maintained by the State of new Jersey, Department of Commerce & Economic Development, Division of Small, Women & Minority Businesses. The Office of the Minority & Women Business Enterprise Program maintains and updates a listing of minority and women owned businesses (M/WB's) providing various categories of goods and services. Minority and/ or women owned businesses (M/WB's) are those registered as such with the State of New Jersey, Department of Commerce & Economic Development, Division of Small, Women & Minority Businesses (SAVI II database). In addition, bona fide minority or women owned businesses that are not so registered will be accepted as such pending completion of the registration process, on recommendation of the Minority/ Women Business Enterprise Development Program (MWBE Director).

B. In the event the contractor who is awarded the contract elects to perform in-house, with its own personnel and resources, parts of the job included in the subcontracting estimate, the participation levels will be adjusted accordingly.

C. Suggested participation levels for this project are:

Minority Owned .....20% of the total dollar amount of the contract

Woman owned .....20% of the total dollar amount of the contract

IV Availability of information/referral lists of minority/women businesses

A. To assist the successful bidder in identifying prospective M/WB subcontractors for various areas of work included in the project, after notification that the City Council has awarded the contract but prior to the execution of the contract, the successful bidder should contact the M/WBE Director with regard to meeting the City's suggested participation levels of M/WB contractors in the specific disciplines involved in the project.

Identification and/or establishment of prospective subcontractors in various specialties by the M/WBE Director or any City employee are not to be construed as making any representation as to the qualification of any such contractor to perform. Such identification/establishment are made for the sole purpose of identifying minority and women owned businesses in the required areas of work. Determination of qualifications for the particular project remains the responsibility of the contractor. Nothing in these requirements is to be construed as changing in

any way the provision that "bidder will be required to establish to the satisfaction of the Architect (Engineer) the reliability and responsibility of the proposed subcontractors to furnish and perform the work . . . ", or any other provision of these specifications.

V. Bidders will submit with bid proposal:

1. Plan for outreach to and utilization of minority and/or women owned businesses as subcontractors, including bidder's anticipated level for M/WB's in each specialty, which parts of the contact bidder plans to subcontract, and which parts of the contract bidder anticipates subcontracting to M/WB's (Form MWB-3)

2. As to subcontractors required to be submitted with the bid proposal pursuant to NJSA 40A:11-16, or any additional subcontractors requested for bid submission by the architect Engineer, bidder will indicate, on Form WMB-3, if any, are minority or woman owned, and what efforts were made to offer subcontracting opportunities to MWB's in these disciplines, including "solicitation list" of contractors solicited to quote on the job and "commitment lists" of those awarded or to be awarded subcontracts.

3. Bidders will provide a separate copy of items 1 and 2 above, which the Purchasing Agent will forward to the MWB director for review.

VI. The following applies to the apparent lowest responsive bidder, or three lowest responsive bidders, after results of bid reception have been announced by the Purchasing Agent:

A. MWBE director will review forms/information submitted by apparent lowest responsible bidder (or three lowest responsible bidders) as part of the bid/proposal, for compliance with nondiscrimination and minority/ women business outreach requirements. These will be preliminary findings, subject to receipt and review of further information/documentation indicated below.

B. MWBE Director may communicate with apparent lowest responsible bidder (or three lowest) requesting further information about subcontractors solicited and subcontractors engaged, and which if any are minority or woman owned, and if appropriate, offering assistance in identifying prospective minority/women subcontractors. (See Form MWB-5). Contractor will have one week to respond. If contractor fails to respond this may resulted in the bid being found non-responsive, on recommendation of the MWBE Director in consultation with the Corporation Counsel.

C. MWBE review will include

1. Verifying that proposed subcontractors listed as M/WB's are listed in the State of NJ SAVI II database or other recognized MWBE listings, e.g., New Jersey Transit, Port Authority, etc. If not, director will attempt to ascertain whether said subcontractors are in fact person of color and/or woman owned and controlled, and provide assistance to proposed subcontractors in registering with SAVI II If MWBE Director has reason to believe the proposed subcontractor is not a bona fide or woman owned and operated business he/she will inform the bidding contractor and the city officials referred to in this section, and may require further verification.

2. Verifying whether bidder has achieved the suggested levels of MWB participation.

3. If not, reviewing the contractor's efforts as documented and the contractor's reasons for not achieving such levels.

D. Findings/Recommendations as to compliance

1. If the bidder's MWB targeted participation levels are achieved, bidder will be presumed not to be engaging in unlawful racial and gender discrimination in the selection of subcontractors and suppliers and will be presumed to have engaged in reasonable outreach efforts.

   If the participation levels are not achieved by the bidder, the MWBE director in consultation with the Corporation Counsel will review the contractor's outreach efforts and subcontracting practices to determine is it has engaged in reasonable efforts to provide subcontracting opportunities to minority owned businesses, or if it has engaged or is engaging in unlawful race or sex discrimination.

3. If said review indicates that the bidder has made reasonable efforts to include minority as subcontractors and suppliers and has not engaged in unlawful race and sex discrimination, the bidder will be in compliance with the requirements of these provisions.

4. If said review indicates that the bidder has failed to make reasonable efforts to provide opportunities to minority businesses as subcontractors and suppliers, has or has engaged in unlawful race and sex discrimination, the bidder will be deemed not responsible under the provisions of these regulations and the provisions of the specifications. Such recommendation will be made by the MWBE director to the Purchasing Agent in consultation with the Corporation Counsel. Any bidder whose bid is rejected based on finding of discrimination may request and receive a hearing in accordance with applicable law (local, state and federal).

5. The review and recommendation process referred to in sections C and D should be completed within two weeks.

VII Awarding of contract

A. The contract will include a provision that Contractor will continue to comply with the provisions of the Minority/Women Business Program requirements and the MWB participation levels agreed upon.

B. The MWBE Director will monitor contractor's compliance. In the event that additional or other subcontracting awards become necessary during the course of the project, the MWBE Director will continue to assist in identification of prospective minority/ women subcontractors as appropriate.

(REVISED 4/13)

EXHIBIT B
MANDATORY EQUAL EMPLOYMENT OPPORTUNITY LANGUAGE
N.J.S.A. 10:5-31 et seq. (P.L. 1975, C. 127)
N.J.A.C. 17:27
CONSTRUCTION CONTRACTS

During the performance of this contract, the contractor agrees as follows:

The contractor or subcontractor, where applicable, will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Except with respect to affectional or sexual orientation and gender identity or expression, the contractor will ensure that equal employment opportunity is afforded to such applicants in recruitment and employment, and that employees are treated during employment, without regard to their age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Such equal employment opportunity shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Public Agency Compliance Officer setting forth provisions of this nondiscrimination clause.

The contractor or subcontractor, where applicable will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex.

The contractor or subcontractor will send to each labor union, with which it has a collective bargaining agreement, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under this act and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

The contractor or subcontractor, where applicable, agrees to comply with any regulations promulgated by the Treasurer, pursuant to N.J.S.A. 10:5-31 et seq., as amended and supplemented from time to time and the Americans with Disabilities Act.

When hiring or scheduling workers in each construction trade, the contractor or subcontractor agrees to make good faith efforts to employ minority and women workers in each construction trade consistent with the targeted employment goal prescribed by N.J.A.C. 17:27-7.2; provided, however, that the Dept. of LWD, Construction EEO Monitoring Program may, in its discretion, exempt a contractor or subcontractor from compliance with the good faith procedures prescribed by the following provisions, A, B and C, as long as the Dept. of LWD, Construction EEO

EXHIBIT B (2 of 4)

Monitoring Program is satisfied that the contractor or subcontractor is employing workers provided by a union which provides evidence, in accordance with standards prescribed by the Dept. of LWD, Construction EEO Monitoring Program, that its percentage of active "card carrying" members who are minority and women workers is equal to or greater than the targeted employment goal established in accordance with N.J.A.C. 17:27-7.2. The contractor or subcontractor agrees that a good faith effort shall include compliance with the following procedures:

(A) If the contractor or subcontractor has a referral agreement or arrangement with a union for a construction trade, the contractor or subcontractor shall, within three business days of the contract award, seek assurances from the union that it will cooperate with the contractor or subcontractor as it fulfills its affirmative action obligations under this contract and in accordance with the rules promulgated by the Treasurer pursuant to N.J.S.A. 10:5-31 et. seq., as supplemented and amended from time to time and the Americans with Disabilities Act. If the contractor or subcontractor is unable to obtain said assurances from the construction trade union at least five business days prior to the commencement of construction work, the contractor or subcontractor agrees to afford equal employment opportunities minority and women workers directly, consistent with this chapter. If the contractor's or subcontractor's prior experience with a construction trade union, regardless of whether the union has provided said assurances, indicates a significant possibility that the trade union will not refer sufficient minority and women workers consistent with affording equal employment opportunities as specified in this chapter, the contractor or subcontractor agrees to be prepared to provide such opportunities to minority and women workers directly, consistent with this chapter, by complying with the hiring or scheduling procedures prescribed under (B) below; and the contractor or subcontractor further agrees to take said action immediately if it determines that the union is not referring minority and women workers consistent with the equal employment opportunity goals set forth in this chapter.

(B) If good faith efforts to meet targeted employment goals have not or cannot be met for each construction trade by adhering to the procedures of (A) above, or if the contractor does not have a referral agreement or arrangement with a union for a construction trade, the contractor or subcontractor agrees to take the following actions:

(l) To notify the public agency compliance officer, the Dept. of LWD, Construction EEO Monitoring Program, and minority and women referral organizations listed by the Dept. of LWD, Construction EEO Monitoring Program pursuant to N.J.A.C. 17:27-5.3, of its workforce needs, and request referral of minority and women workers;

(2) To notify any minority and women workers who have been listed with it as awaiting available vacancies;

(3) Prior to commencement of work, to request that the local construction trade union refer minority and women workers to fill job openings, provided the contractor or subcontractor has a referral agreement or arrangement with a union for the construction trade;

(4) To leave standing requests for additional referral to minority and women workers with the local construction trade union, provided the contractor or subcontractor has a referral agreement or arrangement with a union for the construction trade, the State Training and Employment Service and other approved referral sources in the area;

(5) If it is necessary to lay off some of the workers in a given trade on the construction site, layoffs shall be conducted in compliance with the equal employment opportunity and non-discrimination standards set forth in this regulation, as well as with applicable Federal and State court decisions;

(6) To adhere to the following procedure when minority and women workers apply or are referred to the contractor or subcontractor:

(i) The contactor or subcontractor shall interview the referred minority or women worker.

(ii) If said individuals have never previously received any document or certification signifying a level of qualification lower than that required in order to perform the work of the construction trade, the contractor or subcontractor shall in good faith determine the qualifications of such individuals. The contractor or subcontractor shall hire or schedule those individuals who satisfy appropriate qualification standards in conformity with the equal employment opportunity and non-discrimination principles set forth in this chapter. However, a contractor or ubcontractor shall determine that the individual at least possesses the requisite skills, and experience recognized by a union, apprentice program or a referral agency, provided the referral agency is acceptable to the Dept. of LWD, Construction EEO Monitoring Program. If necessary, the contractor or subcontractor shall hire or schedule minority and women workers who qualify as trainees pursuant to these rules. All of the requirements, however, are limited by the provisions of (C) below.

(iii) The name of any interested women or minority individual shall be maintained on a waiting list, and shall be considered for employment as described in (i) above, whenever vacancies occur. At the request of the Dept. of LWD, Construction EEO Monitoring Program, the contractor or subcontractor shall provide evidence of its good faith efforts to employ women and minorities from the list to fill vacancies.

(iv) If, for any reason, said contractor or subcontractor determines that a minority individual or a woman is not qualified or if the individual qualifies as an advanced trainee or apprentice, the contractor or subcontractor shall inform the individual in writing of the reasons for the determination, maintain a copy of the determination in its files, and send a copy to the public agency compliance officer and to the Dept. of LWD, Construction EEO Monitoring Program.

(7) To keep a complete and accurate record of all requests made for the referral of workers in any trade covered by the contract, on forms made available by the Dept. of LWD, Construction EEO Monitoring Program and submitted promptly to the Dept. of LWD, Construction EEO Monitoring Program upon request.

(C) The contractor or subcontractor agrees that nothing contained in (B) above shall preclude the contractor or subcontractor from complying with the union hiring hall or apprenticeship policies in any applicable collective bargaining agreement or union hiring hall arrangement, and, where required by custom or agreement, it shall send journeymen and trainees to the union for referral, or to the apprenticeship program for admission, pursuant to such agreement or arrangement. However, where the practices of a union or apprenticeship program will result in the exclusion of minorities and women or the failure to refer minorities and women consistent with the targeted county employment goal, the contractor or subcontractor shall consider for employment persons referred pursuant to (B) above without regard to such agreement or arrangement; provided further, however, that the contractor or subcontractor shall not be required to employ women and minority advanced trainees and trainees in numbers which result in the employment of advanced trainees and trainees as a percentage of the total workforce for the construction trade, which percentage significantly exceeds the apprentice to journey worker ratio specified in the applicable collective bargaining agreement, or in the absence of a collective bargaining agreement, exceeds the ratio established by practice in the area for said construction trade. Also, the contractor or subcontractor agrees that, in implementing the procedures of (B) above, it shall, where applicable, employ minority and women workers residing within the geographical jurisdiction of the union.

After notification of award, but prior to signing a construction contract, the contractor shall submit to the public agency compliance officer and the Dept. of LWD, Construction EEO Monitoring Program an initial project workforce report (Form AA 201) electronically provided to the public agency by the Dept. of LWD, Construction EEO Monitoring Program, through its website, for distribution to and completion by the contractor, in accordance with N.J.A.C. 17:27-7. The contractor also agrees to submit a copy of the Monthly Project Workforce Report once a month thereafter for the duration of this contract to the Dept. of LWD, Construction EEO Monitoring Program and to the public agency compliance officer.

The contractor agrees to cooperate with the public agency in the payment of budgeted funds, as is necessary, for on the job and/or off the job programs for outreach and training of minorities and women.

(D) The contractor and its subcontractors shall furnish such reports or other documents to the Dept. of LWD, Construction EEO Monitoring Program as may be requested by the Dept. of LWD, Construction EEO Monitoring Program from time to time in order to carry out the purposes of these regulations, and public agencies shall furnish such information as may be requested by the Dept. of LWD, Construction EEO Monitoring Program for conducting a compliance investigation pursuant to **Subchapter 10 of the Administrative Code (NJAC 17:27).**

The undersigned vendor certifies on their company's receipt, knowledge and commitment to comply with:

EXHIBIT B

N.J.S.A. 10:5-31 et seq. (P.L. 1975, C. 127) and N.J.A.C. 17:27
MANDATORY EQUAL EMPLOYMENT OPPORTUNITY LANGUAGE
Construction Contracts

The undersigned vendor further agrees to furnish the required forms of evidence and understands that their contract/company's bid shall be rejected as non-responsive if said contractor fails to comply with the requirements of N.J.S.A. 10:5-31 et seq. (P.L. 1975, C. 127) and N.J.A.C. 17:27.

Representative's Name/Title (Print):_____

Representative's Signaature:_____

Name of Company:_____ **Tel. No.:**_____ **Date:**_____

FORM AA-201
Revised 11/11

STATE OF NEW JERSEY

DEPARTMENT OF LABOR & WORKFORCE DEVELOPMENT
CONSTRUCTION EEO COMPLIANCE MONITORING PROGRAM

INITIAL PROJECT WORKFORCE REPORT CONSTRUCTION

Official Use Only
Assignment
Code

For instructions on completing the form, go to: http://www.state.nj.us/treasury/contract_compliance/pdf/aa201ins.pdf

1. FID NUMBER

2. CONTRACTOR ID NUMBER

3. NAME AND ADDRESS OF PRIME CONTRACTOR

(Name)

(Street Address)

(City) (State) (Zip Code)

4. IS THIS COMPANY MINORITY OWNED [ ] OR WOMAN OWNED [ ]

5. NAME AND ADDRESS OF PUBLIC AGENCY AWARDING CONTRACT
Name:
Address:

CONTRACT NUMBER DATE OF AWARD DOLLAR AMOUNT OF AWARD

6. NAME AND ADDRESS OF PROJECT
Name:
Address:

COUNTY

7. PROJECT NUMBER

8. IS THIS PROJECT COVERED BY A PROJEC LABOR AGREEMENT (PLA)? YES

9. TRADE OR CRAFT	PROJECTED TOTAL EMPLOYEES				PROJECTED MINORITY EMPLOYEES				PROJECTED PHASE-IN DATE	PROJECTED COMPLETION DATE
	MALE		FEMALE		MALE		FEMALE			
	J	AP	J	AP	J	AP	J	AP		
1. ASBESTOS WORKER										
2. BRICKLAYER OR MASON										
3. CARPENTER										
4. ELECTRICIAN										
5. GLAZIER										
6. HVAC MECHANIC										
7. IRONWORKER										
8. OPERATING ENGINEER										
9. PAINTER										
10. PLUMBER										
11. ROOFER										
12. SHEET METAL WORKER										
13. SPRINKLER FITTER										
14. STEAMFITTER										
15. SURVEYOR										
16. TILER										
17. TRUCK DRIVER										
18. LABORER										
19. OTHER										
20. OTHER										

I hereby certify that the foregoing statements made by me are true. I am aware that if any of the foregoing statements are willfully false, I am subject to punishment.

(Signature)

10. (Please Print Your Name) (Title)

(Area Code) (Telephone Number) (Ext.) (Date)

Sample Initial Project Workforce Report Form AA201

Instructions

INSTRUCTIONS FOR COMPLETING THE INITIAL PROJECT
WORKFORCE REPORT – CONSTRUCTION (AA201)

DO NOT COMPLETE THIS FORM FOR GOODS AND/OR SERVICE CONTRACTS

1. Enter the Federal Identification Number assigned to the contractor by the Internal Revenue Service, or if a Federal Employer Identification Number has been applied for but not yet issued, or if your business is such that you have not or will not receive a Federal Identification Number, enter the social security number assigned to the single owner or one partner, in the case of a partnership.

2. Note: The Department of Labor & Workforce Development, Construction EEO Monitoring Program will assign a contractor ID number to your company. This number will be your permanently assigned contractor ID number that must be on all correspondence and reports submitted to this office.

3. Enter the prime contractor's name, address and zip code number.

4. Check box if Company is Minority Owned or Woman Owned

5. Enter the complete name and address of the Public Agency awarding the contract. Include the contract number, date of award and dollar amount of the contract.

6. Enter the name and address of the project, including the county in which the project is located.

7. Note: A project contract ID number will be assigned to your firm upon receipt of the completed Initial Project Workforce Report (AA201) for this contract. This number must be indicated on all correspondence and reports submitted to this office relating to this contract.

8. Check "Yes" or "No" to indicate whether a Project Labor Agreement (PLA) was established with the labor organization(s) for this project.

9. Under the Projected Total Number of Employees in each trade or craft and at each level of classification, enter the total composite workforce of the prime contractor and all subcontractors projected to work on the project. Under Projected Employees enter total minority and female employees of the prime contractor and all subcontractors projected to work on the project. Minority employees include Black, Hispanic, American Indian and Asian, (J=Journeyworker, AP=Apprentice). Include projected phase-in and completion dates.

10. Print or type the name of the company official or authorized Equal Employment Opportunity (EEO) official include signature and title, phone number and date the report is submitted.

This report must be submitted to the Public Agency that awards the contract and the Department of Labor & Workforce Development, Construction EEO Compliance Monitoring Program after notification of award, but prior signing the contract.

THE CONTRACTOR IS TO RETAIN A COPY AND SUBMIT COPY TO THE PUBLIC AGENCY AWARDING THE CONTRACT AND FORWARD A COPY TO:

NEW JERSEY DEPARTMENT OF LABOR & WORKFORCE DEVELOPMENT
CONSTRUCTION EEO COMPLIANCE MONITORING UNIT
P.O. BOX 209
TRENTON, NJ 08625-0209
(609) 292-9550

FORM AA-202

REVISED 10/11

State Of New Jersey

Department of Labor & Workforce Development
Construction EEO Compliance Monitoring Program

MONTHLY PROJECT WORKFORCE REPORT - CONSTRUCTION

For instructions on completing the form, go to:
http://www.state.nj.us/treasury/contract_compliance/pdf/aa202ins.pdf

3. FID or SS Number

1. Name and address of Prime Contractor

2. Contractor ID Number

4. Reporting Period

(NAME)

5. Public Agency Awarding Contract

Date of Award

(ADDRESS)

6. Name and Location of Project

County

7. Project ID Number

(CITY) (STATE) (ZIP CODE)

8. CONTRACTOR NAME (LIST PRIME CONTRACTOR WITH SUBS FOLLOWING)	9. PERCENT OF WORK COMPLETED	10. TRADE OR CRAFT	CLASSIFICATION (SEE REVERSE)	11. NUMBER OF EMPLOYEES						12. TOTAL NO OF MIN EMP	13. WORK HOURS			14. % OF WORK HRS		15. CUM. WORK HRS			16. CUM. % OF WKR	
				A. TOTAL	B. BLACK	C. HISPANIC	D. AMERICAN INDIAN	E. ASIAN	F. FEMALES		TOTAL WORK HOURS	A. MIN WKR	B. FEMALE WKR	A. % OF MIN WKR	B. % OF FEMALE WKR	TOTAL WORK HOURS	A. MIN WKR HOURS	B. FEMALE HOURS	A. % OF MIN WKR	B. % OF FEM WKR
			J																	
			AP																	
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			J																	
			AP																	
			J																	
			AP																	

17. COMPLETED BY (PRINT OR TYPE)

(NAME) (SIGNATURE) (TITLE)

(AREA CODE) (TELEPHONE NUMBER) (EXT.) (DATE)

Sample Monthly Project Workforce Report Form AA202

Instructions

INSTRUCTIONS FOR COMPLETING MONTHLY PROJECT WORKFORCE REPORT- (AA202)

1. Enter the prime contractor's name, address and zip code number.

2. Enter the **CONTRACTOR ID NUMBER** assigned by the Dept. of Labor & Workforce Development Construction EEO Compliance Monitoring Program.

3. Enter the Federal Identification Number assigned to the contractor by the Internal Revenue Service, or if a Federal Employer Identification Number has not been applied for or issued, or if your business is such that it will not receive a Federal Identification Number, enter the Social Security Number of the owner or of one partner, in the case of a partnership.

4. Reporting Period - enter the beginning and ending dates of the month for the report being submitted. (i.e., 1/1/00 - 1/31/00).

5. Enter the complete name of the public agency awarding the contract. Include the date of contract award.

6. Enter the name and location of the project, including the county in which the project is located.

7. Enter the **PROJECT NUMBER** assigned by the Dept. of Labor & Workforce Development Construction EEO Compliance Monitoring Program.

8. Enter the company name(s) of the contractor(s) performing work at the construction site. List the prime contractor first with subcontractor(s) following.

9. Enter the total percent (%) of project work the contractor or subcontractor has completed, to date.

10. Identify the trades or crafts applicable to the prime contractor and each subcontractor listed in column #8. Use a single line for each trade or craft.

11. Enter the total number of employees for each contractor at each level of classification (J=Journeyworker, AP=Apprentice) and the total number of each minority group - Black, Hispanic, American Indian, Asian and Female. Note: Column A shall include Total Number of employees. Columns B-E shall also include minority females. Column F shall include both non-minority and minority females.

12. Enter the total number of minority employees for each employer at each level of classification. Note: This shall be the sum of columns B-E.

13. Enter the Total Monthly work hours for all employees in each craft at each level of classification.
    (A) Enter the Total Monthly minority work hours for each craft at each level of classification (Columns B-E).
    (B) Enter the Total Monthly female work hours for each craft at each level of classification (Column F).

14. (A) Enter the Total Monthly PERCENT of minority work hours for each craft at each level of classification.
    (B) Enter the Total Monthly PERCENT of female work hours for each craft at each level of classification.

15. Enter the Total Cumulative work hours for each craft at each level of classification.
    (A) Enter the Total Cumulative minority work hours for each craft at each level of classification.
    (B) Enter the Total Cumulative female work hours for each craft at each level of classification.

16. (A) Enter the Cumulative Percent of minority work hours for each craft at each level of classification.
    (B) Enter the Cumulative Percent of female work hours for each craft at each level of classification.

17. Print or type the name of the company official submitting the report; include signature, title, telephone number, and date the report is submitted.

THE CONTACTOR SHOULD RETAIN ONE COPY AND SUBMIT A COPY TO THE PUBLIC AGENCY WHICH AWARDED THE CONTRACT. ANOTHER COPY MUST BE FORWARDED TO:

New Jersey Department of Labor & Workforce Development
Construction EEO Compliance Monitoring Program
PO Box 209
Trenton, NJ 08625-0209
609 292-9550

APPENDIX A
AMERICANS WITH DISABILITIES ACT OF 1990
Equal Opportunity for Individuals with Disability

The contractor and the _____ of _____, (hereafter "owner") do hereby agree that the provisions of Title 11 of the Americans With Disabilities Act of 1990 (the "Act") *(42 U.S.C. S121 01* et seq.), which prohibits discrimination on the basis of disability by public entities in all services, programs, and activities provided or made available by public entities, and the rules and regulations promulgated pursuant there unto, are made a part of this contract. In providing any aid, benefit, or service on behalf of the owner pursuant to this contract, the contractor agrees that the performance shall be in strict compliance with the Act. In the event that the contractor, its agents, servants, employees, or subcontractors violate or are alleged to have violated the Act during the performance of this contract, the contractor shall defend the owner in any action or administrative proceeding commenced pursuant to this Act. The contractor shall indemnify, protect, and save harmless the owner, its agents, servants, and employees from and against any and all suits, claims, losses, demands, or damages, of whatever kind or nature arising out of or claimed to arise out of the alleged violation. The contractor shall, at its own expense, appear, defend, and pay any and all charges for legal services and any and all costs and other expenses arising from such action or administrative proceeding or incurred in connection therewith. In any and all complaints brought pursuant to the owner's grievance procedure, the contractor agrees to abide by any decision of the owner which is rendered pursuant to said grievance procedure. If any action or administrative proceeding results in an award of damages against the owner, or if the owner incurs any expense to cure a violation of the ADA which has been brought pursuant to its grievance procedure, the contractor shall satisfy and discharge the same at its own expense.

The owner shall, as soon as practicable after a claim has been made against it, give written notice thereof to the contractor along with full and complete particulars of the claim, If any action or administrative proceeding is brought against the owner or any of its agents, servants, and employees, the *owner shall* expeditiously forward or have forwarded to the contractor every demand, complaint, notice, summons, pleading, or other process received by the owner or its representatives.

It is expressly agreed and understood that any approval by the owner of the services provided by the contractor pursuant to this contract will not relieve the contractor of the obligation to comply with the Act and to defend, indemnify, protect, and save harmless the owner pursuant to this paragraph.

It is further agreed and understood that the owner assumes no obligation to indemnify or save harmless the contractor, its agents, servants, employees and subcontractors for any claim which may arise out of their performance of this Agreement. Furthermore, the contractor expressly understands and agrees that the provisions of this indemnification clause shall in no way limit the contractor's obligations assumed in this Agreement, nor shall they be construed to relieve the contractor from any liability, nor preclude the owner from taking any other actions available to it under any other provisions of the Agreement or otherwise at law.

Representative's Name/Title Print):_____
Representative's Signature:_____
Name of Company:_____
Tel. No.:_____ **Date:**_____

SAMPLE LETTER TO THE UNION

(CONTRACTOR'S LETTER HEAD)

Date:

Local Union: _____

Re: _____Project, Jersey City, NJ

This company is about to enter into a contract with the City of Jersey City for the above project. A condition of the contract is compliance with the state approved affirmative action program, which requires that we make a good faith effort to use minority workers in each construction trade to the extent of ____% of the total work hours, and female workers to the extent of 6.9% of total work hours.

We are further required to submit a statement from an authorized union official, that the union will take such actions as may be necessary with respect to the referral and employment of minority group persons in order to enable this contractor to meet its obligations under the affirmative action plan.

We solicit your help and cooperation, by engaging in aggressive recruitment of minority workers, providing us with the statement requested, and advising whether the union will be able to fulfill our work force needs as indicated.

Very Truly Yours,

_____

Minority/Woman Business Enterprise (MWBE) Questionnaire for Bidders

Jersey City Ordinance C-829 establishes a goal of awarding 20% of the dollar amount of total city procurement to minority and woman owned business enterprises.

To assist us in monitoring our achievement of this goal, please indicate below whether your company is or is not a minority owned and/or woman owned business, and return this form with your bid proposal.

Business Name : _____

Address : _____

Telephone No. : _____

Contact Name: _____

Please check applicable category :

_____ Minority Owned Business (MBE)

_____ Minority & Woman Owned Business (MWBE)

_____ Woman Owned business (WBE)

_____ Neither

Definitions:

Minority Business Enterprise

Minority Business Enterprise means a business which is a sole proprietorship, partnership or corporation at least 51% of which is owned and controlled by persons who are African American, Hispanic, Asian American, American Indian or Alaskan native, defined as follows:

African American: a person having origins in any of the black racial groups of Africa

Hispanic: a person of Mexican, Puerto Rican, Central or South American or other non-European Spanish culture or origin regardless of race.

Asian: a person having origins in any of the original peoples of the Far East, South East Asia, Indian subcontinent, Hawaii or the Pacific Islands.

American Indian or Alaskan Native: a person having origins in any of the original peoples of North America and who maintains cultural identification through tribal affiliation or community recognition.

Woman Business Enterprise

Woman Business Enterprise means a business which is a sole proprietorship, partnership or corporation at least 51% of which is owned and controlled by a woman or women.

OFFICE OF EQUAL EMPLOYMENT OPPORTUNITY/AFFIRMATIVE ACTION COPY

Minority/Woman Business Enterprise (MWBE) Questionnaire for Bidders

Jersey City Ordinance C-829 establishes a goal of awarding 20% of the dollar amount of total city procurement to minority and woman owned business enterprises.

To assist us in monitoring our achievement of this goal, please indicate below whether your company is or is not a minority owned and/or woman owned business, and return this form with your bid proposal.

Business Name : _____

Address : _____

Telephone No. : _____

Contact Name: _____

Please check applicable category :

_____ Minority Owned Business (MBE)

_____ Minority & Woman Owned Business (MWBE)

_____ Woman Owned business (WBE)

_____ Neither

Definitions:

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Woman Business Enterprise

Woman Business Enterprise means a business which is a sole proprietorship, partnership or corporation at least 51% of which is owned and controlled by a woman or women.

DIVISION OF PURCHASING COPY

Form MWBE Contractor's Compliance Plan to be submitted with bid document.
CONTRACTOR: PROVIDE TWO (2) COMPLETED COPIES OF THIS FORM WITH YOUR PROPOSAL (or within 24 hours thereafter)

City of Jersey City
Department of Administration
Office of Equal Opportunity/Affirmative Action

Project: _____ #_____

Contractor: _____ Bid Amt. S _____

Please list what portions of the work, if any you intend to sublet, the approximate value of the same, and whether you anticipate subletting it to a minority or woman owned contractor, or neither.

Trade	Approx. $ Value	Minority or Woman Owned Business Check appropriate column		
		Minority	Woman	Neither

Receipt of this report by the City does not constitute acceptance by the City of minority business participation goals less than 20% or women business participation goals less than 20% unless specifically agreed to by the Office of Equal Opportunity/Affirmative Action

CONTINUED ON NEXT PAGE

OFFICE OF EQUAL EMPLOYMENT OPPORTUNITY/AFFIRMATIVE ACTION COPY

Form MWBE Contractor's Compliance Plan to be submitted with bid document.
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City of Jersey City
Department of Administration
Office of Equal Opportunity/Affirmative Action

Project: _____ #_____

Contractor: _____ Bid Amt. S _____

Please list what portions of the work, if any you intend to sublet, the approximate value of the same, and whether you anticipate subletting it to a minority or woman owned contractor, or neither.

Trade	Approx. $ Value	Minority or Woman Owned Business Check appropriate column		
		Minority	Woman	Neither

Receipt of this report by the City does not constitute acceptance by the City of minority business participation goals less than 20% or women business participation goals less than 20% unless specifically agreed to by the Office of Equal Opportunity/Affirmative Action

CONTINUED ON NEXT PAGE

DIVISION OF PURCHASING COPY

MWBE Page 3 Project _____

2. As to subcontracted trade mandated to be included in proposal pursuant to N.J.S.A. 40A:11-16, please list name of proposed subcontractor, trade, and whether minority woman, or not:

Trade	Contractor Name & Address	Approx $ Value	Minority or Woman Owned Business Check appropriate column		
			Minority	Woman	Neither

3. What is your policy and practice with respect to outreach and consideration of minority and women-owned vendors/contractors as contractors and/or suppliers?

_____

_____

Name of Contractor

By: Signature_____

Type or print name/title: _____

Telephone No: _____ Date_____

.....

For City Use:

Acceptable M/W Business Participation levels for this Project: _____

By_____ Date: _____

EQUAL EMPLOYMENT OPORTUNITY COPY

MWBE Page 3 Project _____

2. As to subcontracted trade mandated to be included in proposal pursuant to N.J.S.A. 40A:11-16, please list name of proposed subcontractor, trade, and whether minority woman, or not:

Trade	Contractor Name & Address	Approx. $ Value	To Minority or Woman Owned Business Check appropriate column		
			Minority	Woman	Neither

3. What is your policy and practice with respect to outreach and consideration of minority and women-owned vendors/contractors as contractors and/or suppliers?

_____

_____

Name of Contractor

By: Signature_____

Type or print name/title:_____

Telephone No: _____ Date_____

.....

For City Use:

Acceptable M/W Business Participation levels for this Project: _____

By_____ Date: _____

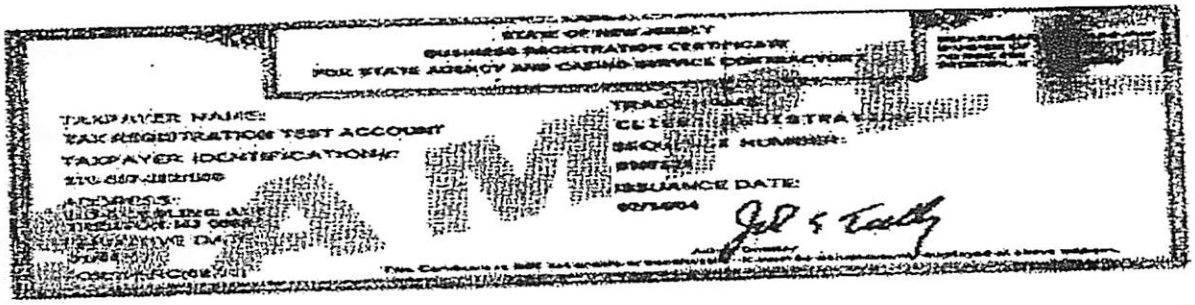
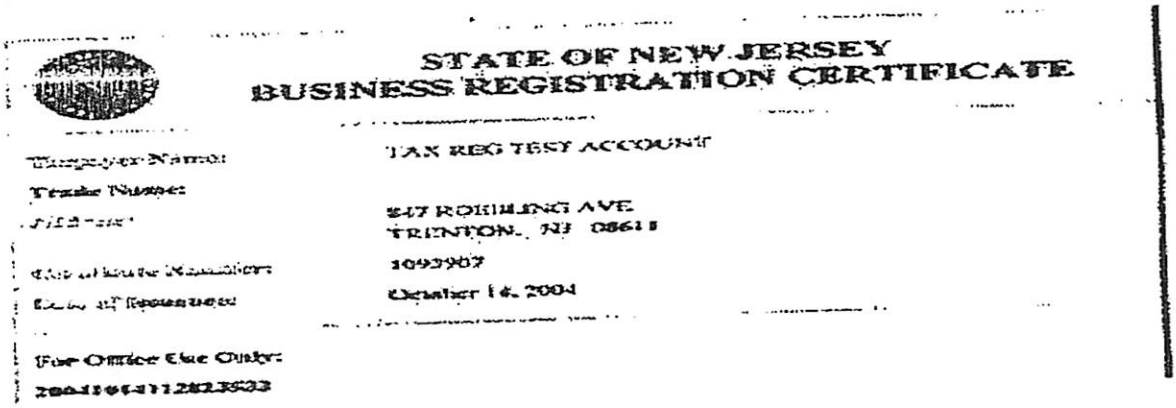
PURCHASING COPY

Revised 04/2013

"New Jersey Business Registration Requirements" For Construction Contracts

The contractor shall provide written notice to its subcontractors of the responsibility to submit proof of business registration to the contractor.

Before final payment on the contract is made by the contracting agency, the contractor shall submit an accurate list and the proof of business registration of each subcontractor or supplier used in the fulfillment of the contract, or shall attest that no subcontractors were used.

For the term of the contract, the contractor and each of its affiliates and a subcontractor and each of its affiliates [N.J.S.A. 52:32-44(g)(3)] shall collect and remit to the Director, New Jersey Division of Taxation, the use tax due pursuant to the Sales and Use Tax Act on all sales of tangible personal property delivered into this State, regardless of whether the tangible personal property is intended for a contract with a contracting agency.

A business organization that fails to provide a copy of a business registration as required pursuant to section 1 of P.L.2001, c.134 (C.52:32-44 et al.) or subsection e. or f. of section 92 of P.L.1977, c.110 (C.5:12-92), or that provides false business registration information under the requirements of either of those sections, shall be liable for a penalty of $25 for each day of violation, not to exceed $50,000 for each business registration copy not properly provided under a contract with a contracting agency."