

SECTION 00 11 13

ADVERTISEMENT FOR BIDS (NOTICE TO BIDDERS)

Hopkinton Public Schools
Hopkinton, Massachusetts
Hopkinton Adaptive
Playground

The Hopkinton Public Schools, Hopkinton, Massachusetts, acting through the Hopkinton School Committee invites sealed bids for "Hopkinton Public Schools Adaptive Playground", in accordance with the Contract Documents prepared by BETA GROUP, INC., Consulting Engineers, 315 Norwood Park South, Norwood, Massachusetts, 02062.

Bids will be received at the office of the Assistant Superintendent for Finance & Operations, School Administration Building, 89 Hayden Rowe Street, Hopkinton, MA 01748 until **2:00 PM local time on Friday, December 19, 2025** at which time and place, said Bids will be publicly opened and read aloud.

The location, general characteristics, and principal details of the Work are indicated in a set of drawings, entitled "Hopkinton Public Schools Adaptive Playground".

The work in this Contract includes, but is not limited to, the construction of a playground to be located at the west end of the Marathon Elementary School. The Work also includes all necessary site work necessary to complete the project.

Bids shall be on a Lump Sum basis.

Bid Security: Certified, treasurer's or cashier's check or bid bond in the sum of five (5) percent of the Total Bid is required.

Time for Completion:

The overall contract period shall extend from the date of the Notice to Proceed no later than April 1, 2026 through September 29, 2026.

The Contractor shall use the period between the Notice to Proceed and June 1, 2026 for submittals, procurement, coordination, and mobilization.

On-site construction activities shall commence no earlier than June 1, 2026 and achieve Substantial Completion by September 29, 2026.

Hard copies of the Contract Documents may be examined and obtained at the offices of BETA Group, Inc., 315 Norwood Park South, Norwood, Massachusetts 02062, upon payment in the amount of Two Hundred Dollars (\$200.00) for each set. Payment shall be by check payable to BETA Group, Inc.

Electronic copy (PDF format) of Contract Documents may be obtained by contacting the Assistant Superintendent for Finance & Operations at srothermich@hopkinton.k12.ma.us at no charge

Direct all inquiries to Nathan Socha, PLA, ASLA – Project Manager, BETA Group, Inc., Nathan Socha NSocha@BETA-Inc.com (401.333.2382)

All Bids for this project are subject to applicable bidding laws of Massachusetts, including General Laws Chapter 30, Section 39M as amended.

Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and minimum wage rates to be paid under this Contract as determined by the Department of Labor and Industries under provisions of the Massachusetts General Laws Chapter 149, Section 26-27, inclusive, as amended.

The successful Bidder must furnish 100 percent Performance and Payment (Labor and Materials) Bonds.

The Owner and Engineer, being considered the sole and only judge, reserves the right to waive any informality in, or to reject, any or all bids, should the Owner deem it to be in the owner's best interest to do so.

- Hopkinton Public Schools School Committee

SECTION 00 21 13

INSTRUCTIONS TO BIDDERS (INFORMATION FOR BIDDERS)

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1.01 RECEIPT AND OPENING OF BIDS

- A. The Hopkinton Public Schools, acting through the Hopkinton School Committee, herein called the Owner, invites sealed bids for "Hopkinton Public Schools Adaptive Playground," herein after called Adaptive Playground, in accordance with the Contract Documents prepared by BETA Group, Inc., Consulting Engineers, 315 Norwood Park South, Norwood, Massachusetts, 02062.
- B. Such Bids, submitted in sealed envelopes plainly marked in the upper left hand corner with the Bidder's name and address, plainly marked in the lower left hand corner with the date and time of opening, addressed to: Hopkinton Public Schools, 89 Hayden Rowe Street, Hopkinton, Massachusetts 01748, "Adaptive Playground"

Delivered by: **2:00 PM local time on Friday, December 19, 2025**

at which time and place, said Bids will be publicly opened and read aloud.

- C. The Owner may consider informal, any bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities in or reject any and all Bids. Conditional or qualified Bids will not be accepted. Any Bid received after the time and date specified shall not be considered. Should there be reasons why the Contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the Owner and the Bidder.

1.02 LOCATION AND WORK TO BE DONE

- A. The location, general characteristics, and principal details of the Work are indicated in a set of drawings, entitled "Adaptive Playground"
- B. Details and Schedules bound in the Appendices, and the Drawings listed above are the Contract Drawings, sometimes referred to herein as the "Drawings".
- C. Additional drawings showing details in accordance with which the Work is to be done will be furnished from time to time by the Engineer, if found necessary, and shall then become part of the Drawings.
- D. The Contractor shall furnish all labor, services, materials, equipment, plant machinery, apparatus, appliances, tools, supplies and all other things necessary to perform all work required for the completion of each item of the Work and as herein specified.
- E. The Work to be done and paid for under any item shall not be limited to the exact extent mentioned or described, but shall include all incidental work necessary or customarily done for the completion of that item.

1.03 CONTRACT DOCUMENTS

- A. The Contract Documents, INFORMATION FOR BIDDERS, SPECIFICATIONS, and forms for BID, AGREEMENT, and BONDS, may be **examined and obtained** at the offices of BETA Group, Inc., 315 Norwood Park South, Norwood, Massachusetts, 02062, Telephone No. (781) 255-1982.

1.04 QUESTIONS REGARDING DRAWINGS AND DOCUMENTS

- A. In general, no answer will be given to prospective bidders in reply to an oral question of the intent or meaning of the Drawings or other Contract Documents, or the equality or use of products or methods other than those designated or described on the Drawings or in the Specifications. Any information given to bidders other than by means of the Drawings and other Contract Documents, including Addenda, as described below, is given informally, for information and the convenience of the bidder only and is not guaranteed. The bidder agrees that such information shall not be used as the basis of nor shall the giving of any such information entitle the bidder to assert any claim or demand against the Owner or the Engineer on account thereof.

- B. To receive consideration, such questions shall be submitted in writing or faxed to the Engineer (for this purpose, BETA Group, Inc., **315 Norwood Park South, Norwood, Massachusetts, 02062, Telephone No. (781) 255-1982, Fax No. (781) 255-1974** at least seven calendar days before the established date for receipt of Bids. If the question involves the equality or use of products or methods, it must be accompanied by drawings, specifications or other data in sufficient detail to enable the Engineer to determine the equality or suitability of the product or method. In general, the Engineer will neither approve nor disapprove particular products prior to the opening of Bids; such products will be considered when offered by the Contractor for incorporation into the Work.
- C. The Engineer will set forth as Addenda, which shall become a part of the Contract Documents, such questions received as above provided as in his sole judgment are appropriate or necessary and his decision regarding each. At least two (2) days prior to the receipt of Bids, he will send a copy of these Addenda to those prospective bidders known to have taken out sets of the Drawings and other Contract Documents.
- D. The Contractor agrees to use the products and methods designated or described in the Specifications as amended by the Addenda.

1.05 PRE-BID CONFERENCE

- A. A non-mandatory pre-bid conference will be held on Tuesday, December 2, 2025, at 3:30 PM, on-site at Marathon Elementary School, 25 Marathon Way, Hopkinton, MA..
- B. Attending the Pre-bid conference is, not required but is encouraged to submit a bid.

1.06 BIDDERS TO INVESTIGATE

- A. Bidders are required to submit their Bids upon the following express conditions, which shall apply to and be deemed a part of every Bid received, viz.:
- B. Bidders must satisfy themselves by personal examination of the Work and by such other means as they may wish, as to the actual conditions there existing, the character and requirements of the Work and difficulties attendant upon its execution, and the accuracy of all estimated quantities stated in the Bid.

1.07 INFORMATION NOT GUARANTEED

- A. All information given on the Drawings or in the other Contract Drawings relating to subsurface and other conditions, natural phenomena, existing pipes and other structures is from the best sources at present available to the Owner. All such information is furnished only for the information and convenience of bidders and is not guaranteed.
- B. It is agreed and understood that the Owner does not warrant or guarantee that the subsurface or other conditions, natural phenomena, existing pipes or other structures encountered during construction will be the same as those indicated on the Drawings or in the other Contract Documents.
- C. It is agreed further and understood that no bidder or Contractor shall use or be entitled to use any of the information made available to him or obtained in any examination made by him in

any manner as a basis of or ground for any claim or demand against the Owner or the Engineer, arising from or by reason of any variance which may exist between the information made available and the actual subsurface or other conditions, natural phenomena, existing pipes or other structures actually encountered during the construction work, except as may otherwise be expressly provided for in the Contract Documents.

1.08 CONDITIONS OF WORK

- A. Each bidder must inform himself fully of the conditions relating to the construction and labor under which the work is now or will be performed; failure to do so will not relieve the successful bidder of his obligation to furnish all materials and all labor necessary to carry out the provisions of the Contract Documents and to complete the contemplated Work for the consideration set forth in his bid. Insofar as possible, the Contractor, in the carrying out of his work, shall employ such methods or means as will not cause any interruption of or interference with: the operation of the existing sewer; traffic; use of existing facilities and utilities; locations of existing utilities and structures affecting the work or other similar conditions at the site; character of equipment and facilities needed preliminary to and during prosecution of the work; requirements of owners and controlling authorities, having jurisdiction over the various lands, existing structures, facilities, and utilities; and all other conditions affecting the work to be done, and the labor and materials needed; and he shall make his bid in sole reliance thereon; and shall not, at any time after submission of a bid, assert that there was any misunderstanding in regard to the nature or amount of the work to be done.

1.09 BLANK FORM FOR BID

- A. Each bid must be submitted on the prescribed form, accompanied by the Bid Security and any other requested information. All blank spaces for bid prices must be filled in, in ink or typewritten, both in words and numerical figures, and be signed by the bidder with his business address and place of residence. Where both written words and numerical figures are given, the written words shall apply in the event of conflict. All bids shall be prepared in conformity with, and based upon and submitted subject to, all requirements of the Specifications and Drawings, together with all addenda thereto.
- B. **Bidders shall remove and submit the Bid pages (Section 00 41 13 or 00 41 23) and Bid Bond pages (Section 00 43 13) only. All pages shall be correctly assembled and submitted in accordance with Section 00 11 13.** All erasures or other changes in the Bid must be properly initialed by an authorized representative of the Bidder.

1.10 WITHDRAWAL OF BIDS

- A. Except as hereinafter in this subsection otherwise expressly provided, once his Bid is submitted and received by the Owner for consideration and comparison with other bids similarly submitted, the bidder agrees that he may not and will not withdraw it within Ninety (90) consecutive calendar days after the actual date of the opening of Bids.
- B. Upon proper written request and identification, Bids may be withdrawn only as follows:
 - 1. At any time prior to the designated time for the opening of Bids.

2. Provided the Bid has not theretofore been accepted by the Owner, at any time subsequent to the expiration of the period during which the bidder has agreed not to withdraw his Bid.
- C. Unless a Bid is withdrawn as provided above, the bidder agrees that it shall be deemed open for acceptance until the AGREEMENT has been executed by both parties thereto or until the Owner notifies a bidder in writing that his Bid is rejected or that the Owner does not intend to accept it, or returns his Bid deposit. Notice of acceptance of a Bid shall not constitute rejection of any other Bid.

1.11 BID SECURITY

- A. Each bid must be accompanied by a certified check, treasurer's check or cashier's check issued by, a responsible bank or trust company and payable to the order of the Owner, or by a bid bond prepared on the form of BID BOND attached hereto duly executed and acknowledged by the bidder, as Principal, and by a surety company qualified to do business in the State of Massachusetts and satisfactory to the Owner, as Surety. The check or bid bond shall be in the sum of five (5) percent of the total bid and shall be enclosed in the sealed envelope containing the Bid.
- B. Each such check or bid bond may be held by the Owner as security for the fulfillment of the bidder's agreements as hereinabove set forth and as set forth in the BID. Should the bidder fail to fulfill such agreements, his bid check shall become the property of the Owner or if a bid bond was furnished, the bid bond shall become payable to the Owner, as liquidated damages; otherwise, the bid check shall be returned to the bidder as hereinafter provided, or if the security is a bid bond, the bid bond shall become null and void.
- C. Bid checks will be returned to all except the three lowest bidders within five days, Sundays and legal holidays excluded, after the opening of Bids, and to the three lowest bidders within five days, Sunday and legal holidays excluded, after the Owner and the accepted bidder have executed the AGREEMENT. In the event that the AGREEMENT has not been executed by both the accepted bidder and the Owner within 90 consecutive calendar days after the opening of Bids, the bid check will be returned promptly upon demand of any bidder who has not been notified of the acceptance of his Bid.
- D. Bid checks accompanying Bids, which are rejected, will be returned within five days, Sundays and legal holidays excluded, after rejection.
- E. None of the three lowest Bids shall be deemed rejected, notwithstanding acceptance of any Bid, until the AGREEMENT has been executed by both the Owner and the accepted bidder.

1.12 INTERESTED PARTIES TO CONTRACT

- A. The undersigned declares; that the only person interested this Bid as principals are named herein as such; that no official of the Owner and no person acting for or employed by the Owner is interested directly or indirectly in this Bid, or in any contract which may be made under it, or in any expected profits to arise therefrom; that this Bid is made in good faith, without fraud, collusion or connection with any other person bidding or refraining from bidding for the same work; that he has examined carefully the said instructions and all other documents bound herewith and the Contract Drawings relating to the Contract covered by this Bid and hereby makes them part of this Bid; that he has informed himself fully in regard

to all conditions pertaining to the work and place where it is to be done; and that he has made his own examination and carefully checked his estimates for cost and from them makes this Bid.

1.13 ABILITY AND EXPERIENCE OF BIDDER

- A. No award will be made to any bidder who cannot satisfy the Owner that he has sufficient ability and experience in this class of work and sufficient capital and plant to enable him to prosecute and complete the Work successfully within the time named. The Engineer and the Owner may make such investigation as they deem necessary to determine the ability of the bidder to perform the work; and the bidder shall furnish to the Engineer and the Owner all such information and data for this purpose as the Engineer and the Owner may request.
- B. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligations of the Contract and to complete the Work contemplated therein within the time stated. The Owner's decision or judgment on these matters shall be final, conclusive, and binding for all parties involved.

1.14 BIDS

- A. The Owner reserves the right to waive any informalities in, or to reject any or all Bids which in its sole judgment are either incomplete, conditional, obscure, or not responsive or which contain additions not called for, erasures not properly initialed, alternative, or similar irregularities, or the Owner may waive such omissions, conditions, or irregularities as he may feel appropriate.
- B. Conditional bids will not be accepted. Bidder(s) will be disqualified if more than one proposal is received from an individual, firm, partnership, corporation or association, under the same or different names and such proposals will not be considered.
- C. The Owner reserves the right to reject any or all Bids, should the Owner deem it to be in the public interest to do so.

1.15 COMPARISON OF BIDS

- A. Bids will be compared on the basis of the experience and competence of the bidders and on the basis of the totals of the quantities listed in the proposal under the enumerated items at the unit prices or lump sums bid for these items. The Contract will be awarded to the lowest responsive, responsible and eligible bidder as determined by the Owner and/or its authorized representatives or agents. However, the Owner may reject any and all bids if it is in the public interest to do so.
- B. The term, "Lowest responsive, responsible and eligible bidder," shall mean the bidder whose bid is the lowest of those bidders possessing the skill, ability and integrity necessary for the faithful performance of the Work; who shall certify that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work.
- C. Bids should be made on each separate item of work shown in the bid (proposal) with reasonable relation to the probable cost of doing the work included in such items. The Owner

reserves the right to reject, wholly, any bid on which an item or items thereof are obviously unbalanced or appear to the Owner to be so unbalanced as to affect or to be liable to affect adversely any interests of the Owner. The attention of the bidder is called to the fact that unbalancing of bids may adversely affect the Contractor if certain portions for the Work are increased or decreased as provided in the Contract Documents.

- D. A bidder shall state the proposed price for the work by which the bids will be compared. This price is to cover all the expenses incidental to the completion of the work in full conformity with the Contract, Specifications, and Drawings. In the event that there is a discrepancy between the unit prices and the extended totals, the unit prices shall govern. In the event that there is a discrepancy between the lump-sum or unit prices written in words and numerical figures, the prices written in words shall govern. No bid will be accepted which does not contain a unit price or lump sum as indicated for each of the applicable items enumerated in the proposal form.

1.16 REDUCTION IN SCOPE OF WORK

- A. The Owner reserves the right to decrease the scope of the work to be done under this Contract and to omit any work in order to bring the cost within available funds. To this end, the Owner reserves the right to reduce the quantity of any items or omit all of any as set forth in the BID, either prior to executing the Contract or at any time during the progress of the Work. The Owner further reserves the right, at any time during the progress of the Work, to restore all or part of any items previously omitted or reduced. Exercise by the Owner of the above rights shall not constitute any ground or basis of claim for damages or for anticipated profits on the work omitted.

1.17 CONTRACT BONDS

- A. The Bidder whose Bid is accepted agrees to furnish the Contract Bonds in the forms which follow in Section 00 61 13 Performance Bond and 00 61 16 Payment Bond, each in the sum of the full amount of the Bid and/or Contract Price as determined by the Engineer, and duly executed and acknowledged by the said bidder as Principal and by a surety company qualified to do business under the laws of Massachusetts and satisfactory to the Owner, as Surety, for the faithful performance of the contract and payment for labor and materials. The premiums for such Bonds shall be paid by the Contractor.
- B. Surety Companies executing the Contract Bonds must also appear on the U.S. Treasury Department's most current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (Amended) by the Audit Staff Bureau of Accounts.

1.18 POWER OF ATTORNEY

- A. Attorneys-in-fact who sign Bid Bonds or Contract Bonds must file with each Bond a certified and effectively dated copy of their power of attorney.

1.19 EXECUTION OF AGREEMENT

- A. The Bidder whose Bid is accepted will be required and agrees to duly execute the AGREEMENT and furnish the required CONTRACT BONDS within the time limit stated in the BID after notification that the AGREEMENT is ready for signature.

- B. The Bidder whose Bid is accepted upon his failure or refusal to duly execute the AGREEMENT and furnish the required CONTRACT BONDS within the time limit stated in the BID, shall forfeit to the Owner as liquidated damages for such failure or refusal, the surety deposited with his BID.

1.20 INSURANCE CERTIFICATES

- A. The Contractor will not be permitted to start any construction work until he has submitted certificates covering all insurances called for under that subsection of the AGREEMENT, titled "Insurance." The Contractor shall submit said certificates using the forms supplied by the Engineer under said subsection.

1.21 TIME FOR COMPLETION AND LIQUIDATED DAMAGES

- A. The bidder must agree to commence work on or before the date specified in the written "NOTICE TO PROCEED" issued by the Owner, and/or Engineer acting on behalf of the Owner, and to fully complete the project within the time specified in Table A of the Agreement, after the date specified in the written "NOTICE TO PROCEED" as stipulated in Table A of the AGREEMENT. The bidder must further agree to pay as liquidated damages to the Owner, the sum as specified in Table A of the Agreement for each consecutive calendar day thereafter as hereafter provided in the AGREEMENT.

1.22 LAWS AND REGULATIONS

- A. The bidder's attention is directed to the fact that all applicable Federal and State laws, municipal ordinances, and rules and regulations or authorities having jurisdiction over construction of the project, shall apply to the Contract throughout, and shall be deemed to be included in the Contract the same as though herein written out in full.

1.23 WORK ON STATE, MUNICIPAL, AND PRIVATE PROPERTY

- A. Particular attention is hereby directed to the fact that portions of the Work included under this Contract will be done within the limits of properties that are State-owned, municipal-owned, or privately owned. The Contractor shall be responsible for coordinating the prosecution of the Work of this Contract with the property owner and for providing work in accordance with any additional requirements as specified herein.

1.24 DATUM OR LEVELS

- A. The figures given in the Contract and Specifications or upon the Drawings after the word elevation shall mean the distance in feet above mean sea level, the base of the State of Massachusetts and the United States Geodetic Survey (U.S.G.S.).

1.25 STATE SALES AND USE TAX

- A. Materials and equipment purchased for installation under this Contract are exempt from Massachusetts Sales Tax. The Contractor shall file for exemption on behalf of the Owner with the State of Massachusetts Department of Taxation as required by law. The exemption from the Sales Tax shall be taken into account by the Contractor during bidding.

1.26 MANUFACTURER'S EXPERIENCE

- A. Wherever it may be written that an equipment manufacturer must have a specified period of experience with his product, equipment which does not meet the specified experience period may be considered by the Owner and/or Engineer if the equipment supplier or manufacturer is willing to provide a sufficient bond or cash deposit as determined by the Owner and/or Engineer for the duration of the specified time period which will guarantee full replacement of that equipment in the event of failure at no additional cost to the Owner.

1.27 PROTECTION OF LIVES AND HEALTH

- A. The project is subject to all of the Safety and Health Regulations as promulgated by the United States Department of Labor (Title 29, Part 1926/1910 CFR, and all revisions and amendments to date); the Contract Work Hours and Safety Standards Act (40 U.S.C. 327 et seq.) as supplemented by the Department of Labor Regulations (Title 29 CFR Part 5); and OSHA 2207, and all revisions and amendments to date. Contractors are urged to make themselves familiar with the requirements of these regulations.

1.28 NONDISCRIMINATION IN EMPLOYMENT

- A. Contracts for work under this bid (proposal) will obligate the Contractors and subcontractors not to discriminate in employment practices.
- B. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, age, handicap, or national origin. The Contractor shall take affirmative action to ensure that applicants are employed and the employees are treated during employment without regard to their race, color, religion, sex, age, handicap, or national origin. Such actions shall include, but not be limited to, the following: employment, upgrading; demotions, or transfers; recruitment or recruitment advertising, layoffs, or terminations; rates of pay or other forms of compensation; selection for training including apprenticeship; and participation in recreational and education activities. The Contractor agrees to post in conspicuous places available to employees and applicants for employment notice to be provided setting forth the provisions of this non-discrimination clause. The Contractor will in all solicitations or advertisements for employees placed by or on behalf on the Contractor state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, age, handicap or national origin. The Contractor will cause the foregoing provisions to be inserted in all sub-contracts for any work covered by this Contract so that such provisions will be binding upon each sub-contractor and upon sub-contracts for standard commercial supplies or raw materials.
- C. The Contractor shall keep such records and submit such reports concerning the racial and ethnic origin of applicants for employment and employees as the Owner may require as consistent with Federal and State law. The Contractor agrees to comply with such rules, regulations, or guidelines as the State of Massachusetts may implement these requirements. The Contractor further warrants that he will comply with the President's Executive Order No. 11246 or any preceding similar Executive Order relating thereto.
- D. Bidders and Contractors must, if required, submit a compliance report (EPA Form 5720-4) concerning their employment practices and policies in order to maintain their eligibility to receive award of the Contract.

- E. Successful bidders and Contractors must, if required, submit a list of all Subcontractors who will perform work on the project, and written signed statements from authorized agents of labor pools with which they will or may deal with for employees on the work, together with any information to the effect that such labor pools' practices or policies are in conformity with said Executive Order that they will affirmatively cooperate in or offer no hindrance to the recruitment, employment, and equal treatment of employees seeking employment and performing work under this Contract; or a certification as to when such agents or labor pools have failed or refused to furnish them, prior to award of the Contract.
- F. The successful bidder will be required to comply with Equal Opportunity Requirements and to abide by the prevailing wage rates for Public Work Projects for all employees on the job. It is the responsibility of Bidders to inform themselves as to the local labor conditions, overtime compensation, health and welfare contributions, labor supply and prospective changes or adjustment of wage rates. Information is available at the Office of Labor and Workforce Development.

1.29 SEQUENCE OF OPERATIONS

- A. The Contractor must submit to the Engineer within fourteen (14) calendar days after execution of the Contractor Documents, a sequence of operations, giving detailed plans and schedules of his operation including any elements for by-pass pumping and/or flow diversion during the Work. Said sequence of operations shall be reviewed and must be approved by the Owner and Engineer prior to the start of the Work. The Owner reserves the right to limit or, if found necessary and/or required, delay construction, or certain activities thereof, in certain areas of the Contract should the Owner deem it to be in the public's best interest to do so.
- B. The Contractor shall have no claim for additional compensation or damage on account of any such delays and/or required sequence of operations.
- C. The Contractor shall maintain uninterrupted utility services at all times and plan his work accordingly.
- D. The Contractor shall coordinate his activities with any other contract and/or contractor to complete the Work as detailed on the Plans and Specifications.

1.30 WETLANDS AND WATERWAYS

- A. The Contractor's attention is directed to the fact that a portion of the work is located within and/or immediately adjacent to wetlands and waterways. Work within these areas is subject to the jurisdiction of the Massachusetts Department of Environmental Protection. All requirements and/or control measures deemed necessary by the Department shall be strictly adhered to throughout the duration of this Contract.
- B. The Contractor shall not have or assert any claim for nor shall he be entitled to any additional compensation or damages on account of requirements set forth by the Department of Environmental Protection regarding the wetlands and waterways encountered during construction.

1.31 MATERIAL PRICE ADJUSTMENT

- A. This contract is subject to the requirements of Massachusetts General Law c30 s38A, Price adjustment clause in contracts for road, bridge, water and sewer projects awarded under Sec. 39M.

END OF SECTION

SECTION 00 41 13

BID FORM (LUMP SUM)

To the Hopkinton Public Schools, acting through the Hopkinton School Committee, herein called the
"Owner", for
"Hopkinton Public Schools Adaptive Playground," .

The Undersigned, as a bidder herein referred to as singular and masculine, declares as follows:

- (1) The only parties interested in this BID as Principals are named herein;
- (2) this BID is made without collusion with any other person, firm, or corporation;
- (3) no officer, agent, or employee of the Owner is directly or indirectly interested in this BID;
- (4) he has carefully examined the site of the proposed Work and fully informed and satisfied himself as to the conditions there existing, the character and requirements of the proposed Work, the difficulties attendant upon its execution and the accuracy of all estimated quantities stated in this BID, and he has carefully read and examined the Drawings, the annexed proposed AGREEMENT and the Specifications and other Contract Documents therein referred to and knows and understands the terms and provisions thereof;
- (5) he understands that information relative to subsurface and other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) has been furnished only for his information and convenience without any warranty or guarantee, expressed or implied, that the subsurface and/or other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) actually encountered will be the same as those shown on the Drawings or in any of the other Contract Documents and he agrees that he shall not use or be entitled to use any such information made available to him through the Contract Documents or otherwise or obtained by him in his own examination of the site, as a basis of or ground for any claim against the Owner or the Engineer arising from or by reason of any variance which may exist between the aforesaid information made available to or acquired by him and the subsurface and/or other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) actually encountered during the construction work, except as provided in M.G.L. c. 30, section 39N and he has made due allowance therefore in this BID;
- (6) and he understands that the quantities of work tabulated in this BID or indicated on the Drawings or in the Specifications or other Contract Documents are only approximate and are subject to increase or decrease as deemed necessary by the Engineer; and he agrees that, if this BID is accepted he will contract with the Owner, as provided in the copy of the Contract Documents deposited in the office of the Engineer, this BID form being part of said Contract Documents, and that he will perform all the work and furnish all the materials and equipment, and provide all labor, services, plant, machinery, apparatus, appliances, tools, supplies and all other things required by the Contract Documents in the manner and within the time therein prescribed and according to the requirements of the Engineer as therein set forth, and that he will take in full compensation therefore the total dollar amount tabulated from the actual measured quantities of said work and each unit or lump sum price stated in this BID as hereinafter set forth.

(Note: All entries in the entire BID must be made clearly and in ink; price bid must be written in both words and figures.)

<u>Item Number</u>	<u>Brief Description:</u>	<u>Lump Sum Prices</u>
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1	Construct Playground, Mobilization/Demobilization, Site Work and Incidental Construction complete, as indicated on the drawings and as specified,	
		_____dollars
	and_____cents (\$_____)	\$_____

TOTAL LUMP SUM OF BID (Includes item 1):

		_____dollars
and _____	cents	\$_____

The undersigned agrees that for extra work, if any, performed in accordance with the terms and provisions of the annexed form of AGREEMENT, he will accept compensation as stipulated therein as full payment for such extra work.

<u>Item Number</u>	<u>Brief Description:</u>	<u>Lump Sum Prices</u>
------------------------	---------------------------	------------------------

ADD ALT 1	Install Site Furnishings and Shade Structure complete, as indicated on the drawings and as specified,	
		_____dollars
	and_____cents (\$_____)	\$_____

ADD ALT 2	Install Rube Goldberg Panel complete, as indicated on the drawings and as specified,	
		_____dollars
	and_____cents (\$_____)	\$_____

ADD ALT 3	Install Play House complete, as indicated on the drawings and as specified,	
		_____dollars
	and_____cents (\$_____)	\$_____

If the Bid is accepted by the OWNER, the undersigned agrees to commence work under this Contract on a date to be specified in a written "Notice to Proceed" by the Owner and complete the entire work provided to be done under this Contract within the time stipulated in Table "A" of the AGREEMENT. If this bid is accepted by the Owner, the undersigned, also agrees to comply with the provisions of Section 1.15 "Liquidated Damages" and Table A of the Agreement.

As provided in the INFORMATION FOR BIDDERS, the bidder hereby agrees that he will not withdraw this BID, within 90 consecutive calendar days after the actual date of the opening of Bids, and that, if the Owner shall accept this BID, the bidder will duly execute and acknowledge the AGREEMENT and furnish, duly executed and acknowledged, the required CONTRACT BONDS within ten (10) calendar days after notification that the AGREEMENT and other Contract Documents are ready for signature.

Should the bidder fail to execute any of his agreements as hereinabove set forth, the Owner shall have the right to retain as liquidated damages, the Bid Security attached in the sum of

(5 percent of Total Bid)

_____ Dollars,

(\$_____) which shall become the Owner's property for the delay and additional expense to the Owner caused thereby. If a bid bond was given, it is agreed that the amount thereof shall be paid as liquidated damages to the Owner by the Surety. (Bidder must fill in this blank.)

The bidder hereby acknowledges the receipt of, and has included in this BID, the following Addenda:

(To be filled in by Bidder, if Addendums are issues.)

Addendum No. _____, dated _____

Addendum No. _____, dated _____

Addendum No. _____, dated _____

The bidder, by submittal of this BID, agrees with the Owner that the amount of the bid security deposited with this BID fairly and reasonably represents the amount of damages the Owner will suffer due to the failure of the bidder to fulfill his agreements as above provided.

(SEAL)

_____ L.S.
(Name of Bidder)

By _____
(Signature and title of authorized representative)

(Business address)

(City and State)

Date _____

The bidder is a corporation incorporated in the State or Commonwealth of _____
- a partnership - an individual. (Bidder must add and delete as necessary to make this sentence read correctly.)

(Note: If the bidder is a corporation, affix corporate seal and give below the names of its president treasurer, and general manager, if any; if a partnership, give full names and residential addresses of all partners; and if an individual, give residential address, if different from business address.)

The required names and addresses of all persons interested in the foregoing Bid, as Principals, are as follows:

(Add supplementary page if necessary)

CERTIFICATE OF AUTHORIZATION
FOR
BIDDING REPRESENTATIVE

(Note: Bidder must complete for certification of authorized representative signing Bid.)

At a duly authorized meeting of the Board of Directors of the

_____ held on _____, (Name
of Corporation) (Date)

at which all the Directors were present or waived notice, it was voted that

(Name of Authorized Representative) (Title)

of this company shall be, and hereby is, authorized to execute bidding documents, contracts and bonds in the name and on behalf of said company, and to affix the corporate seal thereto, and such execution of any contract obligation in this company's name on its behalf of such

_____ under seal of the company shall be valid and binding upon this company. (Title)
A true copy

ATTEST _____
(Clerk)

Place of Business _____

I hereby certify that I am the clerk of the _____
(Name of Corporation)

_____, that _____
(Name of Authorized Representative)

is the duly elected _____ of said company, and that the
(Title)

above vote has not been amended or rescinded and remains in full force and effect as of the date of this contract.

Corporate
Seal

(Clerk)

STATEMENT OF BIDDERS' QUALIFICATIONS

The following shall accompany the bid and is required as evidence of the bidder's qualifications to perform the work, as bid upon, in accordance with the contract drawings and specifications. This statement must be notarized. All questions must be answered. Additional data may be submitted on separate attached sheets.

1. Name of Bidder_____
2. Permanent Main Office Address_____
3. Official Mailing Address For This Contract_____
4. When Organized?_____
5. Where Incorporated, If a Corporation_____
6. Years Contracting under Present Name_____
7. List contracts on hand, and those completed similar in nature to this kind of project.

Owner	Engineer	Contract	Description	Contract Amount	Completion Date
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

8. List any work the firm has failed to complete, state where and why.

9. If you have ever defaulted on any contract, state where and why.

10. List full names and residences of all principals (i.e.: Officers, Directors, Partners, Owners) interested in this bid.

<u>Name</u>	<u>Residence</u>	<u>Title</u>	<u>Firm</u>
-------------	------------------	--------------	-------------

11. State name(s) and qualifications of resident supervisor(s) for this project.

12. List major equipment available for this project and identify ownership or rental.

13. Will you furnish a detailed financial statement and other information, requested by the Owner?

14. List bank references for verifying financial ability of your company.

<u>Name</u>	<u>Address</u>
-------------	----------------

15. The undersigned hereby authorized and requests any person, firm or corporation, to furnish all information requested by the Owner and/or its designated agents relative to the recitals comprising this Statement of the Bidder's Qualifications.

Dated at _____ this _____ day of _____ 20____.

(Name of Bidder)

By: _____

(Title)

State of _____

County of _____

_____ being duly sworn in person, deposes and says

that he is _____ of _____,
(Title) (Name of Bidder)

that he is the firm's duly authorized agent to execute these contract documents, and that the answers to the foregoing questions and all statements therein contained are correct and true.

Subscribed and sworn to before me this _____ day of _____ 20____.

(SEAL)

(Notary Public)

(My Commission Expires)

STATEMENT OF PROPOSED SUBCONTRACTORS

The following shall accompany the bid and is required as evidence of the bidder's qualifications to perform the work as bid upon, in accordance with the contract drawings and specifications. The Bidder must state the names and appurtenant information of all major subcontractors he proposed to use to complete the work as bid upon. Additional data may be submitted on separate attached sheets.

If subcontractors are not to be used to complete the Work and/or any portion thereof, as herein bid upon, the Bidder must acknowledge by writing "NONE" _____.

Description of Work _____

Approximate percentage of Total Bid _____

Proposed Subcontractor, Name _____

Address _____

Description of Work _____

Approximate percentage of Total Bid _____

Proposed Subcontractor, Name _____

Address _____

Description of Work _____

Approximate percentage of Total Bid _____

Proposed Subcontractor, Name _____

Address _____

Bidder to insert description of work, percentage of Total BID, and subcontractors' names as may be required.

This is to certify that all names of the above-mentioned subcontractors are submitted with full knowledge and consent of the respective parties.

The Bidder warrants that none of the proposed subcontractors have any conflict of interest as respects this contract.

Date _____

Bidder

(Name of Bidder)

By

(Signature)

(Title)

(Business Address)

(City and State)

LABOR HARMONY AND OSHA 10 CERTIFICATION

The undersigned certifies that they will conform to and provide documentation for the requirements as stated in MGL c. 30, §39S(a) as follows:

The bidder certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work; and that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that all employees to be employed in the work subject to this bid have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration.

Name of Contractor/Business

Signature of Authorized Representative of Contractor/Business

Date

CERTIFICATE OF NON - COLLUSION

Any person submitting a bid under this section shall, on such bid, certify the following:
The undersigned certifies under penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this paragraph the word "person" shall mean any natural person, joint venture, partnership, corporation, or other business, or legal entity.

Name of Contractor/Business

Signature of Authorized Representative of Contractor/Business

Date

TAX COMPLIANCE CERTIFICATION

Pursuant to MGL c. 62C, §49A, I certify under the penalties of perjury that, to the best of my knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors and withholding and remitting child support, and, subject to the conditions stated above, the contracting agency confirms with the Massachusetts Department of Revenue (DOR) that the person is in good standing with respect to all returns due and taxes payable to DOR as of the date of confirmation.

Name of Contractor/Business

Signature of Authorized Representative of Contractor/Business

Social Security or Federal Identification Number

Date

SECTION 00 43 13

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we the undersigned (Insert Name of Bidder) _____
_____, as Principal, and (Insert Name of Surety)
_____, as Surety, are hereby held and firmly
bound and obligated unto the Town of Hopkinton, Massachusetts, as Owner, in the sum
of _____ Dollars (\$ _____), as
liquidated damages for payment of which, well and truly to be made, we hereby jointly and severally bind
ourselves, our heirs, executors, administrators, successors and assigns.

The condition of the above obligation is such that whereas the Principal has submitted to the Town of Hopkinton, Massachusetts a certain Bid attached hereto and hereby made a part hereof, to enter into a contract in writing, hereinafter referred to as the "AGREEMENT" and/or "Contract", for "Hopkinton Public Schools Adaptive Playground,"
NOW THEREFORE,

- (a) If said BID shall be rejected or withdrawn as provided in the INFORMATION FOR BIDDERS attached hereto or, in the alternative,
- (b) If said BID shall be accepted and the Principal shall duly execute and deliver the form of AGREEMENT attached hereto and shall furnish the specified bonds for the faithful performance of the AGREEMENT and/or Contract and for the payment for labor and materials furnished for the performance of the AGREEMENT and/or Contract,

then this obligation shall be void, otherwise it shall remain in full force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder in no event shall exceed the amount of this obligation.

The Surety, for value received, hereby agrees that the obligations of said Surety and its bond shall in no way be impaired or affected by any extensions of the time with which such BID may be accepted, and said Surety does hereby waive notice of any such extensions.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, have duly executed this bond on the _____ day of _____, 20 _____.

(SEAL)

(Name of Principal) L.S.

BY: _____
(Signature)

(Title)

(Name of Surety (Seal)

BY: _____
(Signature and Title)

BY: _____
Attorney-In-Fact

Sealed and delivered in
the presence of:

IMPORTANT: Surety Companies executing BONDS must appear on the U.S. Treasury Department's most current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts and be authorized to transact business in the state where the PROJECT is located.

If the Bond is signed on behalf of the Surety by an Attorney-In-Fact, there should be attached, a duly certified copy of his power of attorney showing his authority to sign such Bond.

SECTION 00 52 13

AGREEMENT FORM (CONTRACT AGREEMENT)

Hopkinton Public Schools
Hopkinton, Massachusetts
Hopkinton Adaptive
Playground

THIS AGREEMENT, is executed this _____ day of _____ in the year Two Thousand and [] (herein referred to as the "AGREEMENT") by and between the Town of Hopkinton, Massachusetts party of the first part, and _____ (Name of Contractor) party of the second part.

WITNESSETH, that the parties to these presents, each in consideration of the undertakings, promises, and agreements on the part of the other herein contained, have undertaken, promised, and agreed and do hereby undertake, promise, and agree, the party of the first part for itself, its successors and assigns, and the party of the second part for himself and his heirs, executors, administrators, successors and assigns, as follows:

1.01	Definitions	1.28	Claims for Damages
1.02	The Contract Documents	1.29	Abandonment of Work or Other Default
1.03	Obligations and Liability of Contractor	1.30	Prices for Work
1.04	Authority of the Engineer	1.31	Moneys May Be Retained
1.05	Supervision of Work	1.32	Formal Acceptance
1.06	Insurance	1.33	Progress Estimates
1.07	Patents	1.34	Partial Acceptance
1.08	Compliance with Laws	1.35	Final Estimate and Payment
1.09	Provisions Required by Law Deemed Inserted	1.36	Liens
1.10	Permits	1.37	Claims
1.11	Not to Sublet or Assign	1.38	Application of Moneys Retained
1.12	Delay by Owner	1.39	No Waiver
1.13	Time for Completion	1.40	Liability of Owner
1.14	Liquidated Damages	1.41	Guarantee
1.15	Night, Saturday, Sunday and Holiday Work	1.42	Return of Drawings
1.16	Employ Competent Persons	1.43	Cleaning Up
1.17	Employ Sufficient Labor and Equipment	1.44	Legal Address of Contractor
1.18	Intoxicating Liquors and/or Drugs	1.45	Headings
1.19	Access to Work	1.46	Modification or Termination
1.20	Examination of Work	1.47	Direct Labor cost
1.21	Defective Work, Etc.	1.48	Massachusetts Tax Laws
1.22	Protection Against Water and Storm	1.49	Minority Business
1.23	Right to Materials	1.50	Termination for Convenience
1.24	Changes	1.51	Equal Employment Opportunity...
1.25	Extra Work	1.52	Unlawful Conduct and Participation in Boycott
1.26	Extension of Time on Account of Extra Work		
1.27	Changes Not to Affect Bonds		

1.01 DEFINITIONS

Wherever the words hereinafter defined or pronouns used in their stead occur in the Contract Documents, they shall have the following meaning indicated which shall be applicable to both the singular and plural thereof:

ADDENDA - Written or graphic instruments prior to the opening of Bids which Clarify, correct or change the Bidding Requirements or Contract Documents.

AGREEMENT - the written contract between Owner and Contractor covering the Work to be performed.

"AS DIRECTED," "AS ORDERED," "AS REQUESTED," "AS REQUIRED," "AS PERMITTED," or words of like import are used, it shall be understood that the direction, order, request, requirement, or permission of the Engineer is intended.

"APPROVED," "ACCEPTABLE," "SUITABLE," "SATISFACTORY," and words of like import shall mean approved by, acceptable to, suitable to, or satisfactory to the Engineer.

APPLICATION FOR PAYMENT - Form used by Contractor in requesting progress or final payments, format to be acceptable to the Engineer.

BID - The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

BIDDER - Any person, firm or corporation submitting a bid for the work.

CHANGE ORDER - A document recommended by the Engineer, which is signed by the Contractor and Owner authorizing the addition, deletion or revision in the Work, or adjustment in the Contract Price or Contract Time, issued on or after the effective date of the Agreement.

CONTRACTOR - The person, firm or corporation with whom the Owner has entered into the Agreement. Contract Bonds - Bid, Performance, and Labor and Materials Bonds and other instruments of security furnished by the Contractor and his surety in accordance with the Contract Documents.

CONTRACT DOCUMENTS - The Agreement, Addenda, Bid, Post Bid documentation submitted prior to the Notice Award, The Notice to Proceed, Bonds, General Conditions, Supplementary Conditions, The Specifications, the Drawings, all written Amendments, Change Orders, Field Orders, and Engineers written interpretations and clarifications.

CONTRACT PRICE - The total monies payable to the Contractor under the terms and conditions of the Contract Documents.

CONTRACT TIME - The number of calendar days stated in the Contract Documents for the completion of the Work.

CONSTRUCTION SUPERINTENDENT - That person designated by the Contractor to carry out the provisions of the Contract.

DATUM OR LEVELS - The figures given in the Contract and Specifications or upon the Drawings after the word elevation or abbreviation of it, shall mean the distance in feet above mean sea level, the base of the State in which the Work is located and the United States Geodetic Survey (U.S.G.S.).

DRAWINGS - The part of the Contract Drawings which show the characteristics and Scope of the Work to be performed and which have been prepared or approved by the Engineer.

EARTH - Wherever used as the name of an excavated material or material to be excavated, shall mean all kinds of material other than rock as defined in this section.

ELEVATION - The figures given on the Drawings or in the other Contract Documents after the word "elevation" or abbreviation of it shall mean the distance in feet above the datum adopted by the Engineer.

ENGINEER - The person, firm or corporation duly appointed by the Owner to undertake the duties and powers herein assigned to the Engineer, acting either directly or through duly authorized representatives. (For this Contract, BETA Group, Inc.)

FIELD ORDER - A written order issued by the Engineer which orders minor changes in the Work which do not involve a change in the Contract Price or an extension of the Contract time.

GENERAL REQUIREMENTS - Sections of Division 1 of the Specifications.

"HEREIN," "HEREINAFTER," "HEREUNDER," and words of like import shall be deemed to refer to the Contract Documents.

NOTICE OF AWARD - The written notice of the acceptance of the Bid from the Owner to the successful Bidder.

NOTICE TO PROCEED - Written communication issued by the Owner to the Contractor authorizing him to proceed with the Work and establishing the date of commencement of the Work.

OWNER - The public body or authority, corporation, association, firm or person with whom the Contractor has entered into the Agreement and for whom the Work is to be provided.

PROJECT OR CONTRACT - The undertaking to be performed in the Contract Documents.

PROJECT REPRESENTATIVE - The authorized representative of the owner who is assigned to the project site or any part thereof.

ROCK - wherever used as the name of an excavated material to be excavated, shall mean only boulders and pieces of concrete and masonry exceeding 1 cu. yd. in volume, or igneous, sedimentary, metamorphic, and conglomerate rock which, in the opinion of the Engineer, requires, for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power-operated tool. No soft or disintegrated rock which can be removed with a hand pick or power-operated excavator or shovel, no loose, shaken, or previously blasted rock or broken stone in rock fillings, or elsewhere, and no rock exterior to the maximum limits of measurement allowed, which may fall into the excavation, will be measured or allowed as "rock."

SHOP DRAWINGS - All drawings, diagrams, schedules and other data or information prepared for and submitted by the Contractor, to illustrate portions of the Work.

SPECIFICATIONS - The portions of the Contract documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

SUBCONTRACTOR - An individual, firm or corporation, approved by the Owner and Engineer having a direct contract with the Contractor or with any other Sub-Contractor for the performance of a part of the Work on the Project.

SUBSTANTIAL COMPLETION - Date certified by the Engineer when construction is sufficiently complete, in accordance with the Contract Documents, so the Owner can occupy or utilize the Work or designated portion thereof for which it was intended, as expressed in the Contract documents.

SUPPLEMENTARY CONDITIONS - The part of the Contract Documents which amends or supplements the General Conditions.

SUPPLIER - Any person or organization who supplies materials or equipment for the Work, including that fabricated to a special design, but who does not perform labor at the site.

WRITTEN NOTICE - Any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed when posted by certified or registered mail to the said party at his last given

address or delivered in person to said party or his authorized representative on the Work.

WORK - The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work includes and is the result of performing or furnishing labor and furnishing and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents.

1.02 THE CONTRACT DOCUMENTS

A. The Contract Documents, as defined above, are sometimes herein referred to as the "Contract".

The Contract Documents are complementary, and what is called for by anyone shall be as binding as if called for by all. In the event of any conflict or inconsistency between the provisions of the AGREEMENT and the provisions of any of the other Contract Documents, the provisions of the AGREEMENT shall prevail.

A. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the edition of the standard specification, manual, code or laws or regulations identified in the reference. In the event a particular edition is not identified, the reference shall mean the latest amended edition in effect at the time of receipt of the Bid. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall change the duties and responsibilities of the Owner, the Contractor or the Designer, or any of their consultants, agents or employees from those set forth in the Contract Documents, nor shall it be effective to assign to the Engineer, or any of the Engineer's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the work or any duty or authority to undertake responsibility contrary to the provisions of the AGREEMENT.

1.03 OBLIGATIONS AND LIABILITY OF CONTRACTOR

A. The Contractor shall do all the work and perform and furnish all the labor, services, materials, equipment, plant, machinery, apparatus, appliances, tools, supplies and all other things (except as otherwise expressly provided herein) necessary and as herein specified for the proper performance and completion of the Work in the manner and within the time hereinafter

specified, in strict accordance with the Drawings, Specifications and other Contract Documents, in conformity with the directions and to the satisfaction of the Engineer, and at the prices herein agreed upon therefor.

B. All parts of the Work and all fixtures, equipment, apparatus and other items indicated on the Drawings and not mentioned in the Specifications, or vice versa, and all work and material usual and necessary to make the work complete in all its parts, including all incidental work necessary to make it complete and satisfactory and ready for use and operation, whether or not they are indicated on the Drawings or mentioned in the Specifications, shall be furnished and executed the same as if they were called for both by the Drawings and by the Specifications.

C. The Contractor shall coordinate his operations with those of any other contractors who may be employed on other work of the Owner, shall avoid interference therewith, and shall cooperate in the arrangements for storage of materials and equipment.

D. The Contractor shall conduct his work so as to interfere as little as possible with private business and public travel. Wherever and whenever necessary or required, he shall maintain fences, furnish watchmen, maintain lights, and take such other precaution as may be necessary to protect life and property.

E. The Contractor shall indemnify and save harmless the Owner and the Engineer and their officers, agents, servants and employees, from and against any and all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses, including attorneys' fees, on account of bodily injury, sickness, disease or death sustained by any person or persons or injury or damage to or destruction of any property, directly or indirectly arising out of, relating to or in connection with the Work, whether or not due or claimed to be due in whole or in part to the active, passive or concurrent negligence or fault of the Contractor, his officers, agents, servants or employees, any of his subcontractors, or any of their respective officers, agents, servants or employees and/or any other person or persons, and whether or not such claims, demands, suits or proceedings are just, unjust, groundless, false or fraudulent; and the Contractor shall and does hereby assume and agrees to pay for the defense of all such claims, demands, suits and proceedings, provided, however, that the Contractor shall not be required to indemnify the Engineer, his officers, agents, servants or employees, against any such damages occasioned solely by defects in maps, plans, drawings, designs or

specifications prepared, acquired or used by the Engineer and/or solely by the negligence or fault of the Engineer; and provided further, that the Contractor shall not be required to indemnify the Owner, his officers, agents, servants or employees, against any such damages occasioned solely by acts or omissions of the Owner other than supervisory acts or omissions of the Owner in the Work.

F. The Contractor shall have complete responsibility for the Work and the protection thereof, and for preventing injuries to persons and damage to the Work and property and utilities on or about the Work, until final completion and final acceptance thereof. He shall in no way be relieved of his responsibility by and right of the Engineer to give permission or directions relating to any part of the Work, by any such permission or directions given, or by failure of the Engineer to give such permission or directions. The Contractor shall bear all costs, expenses, losses and damages on account of the quantity or character of the Work or the nature of the land (including but not limited to subsurface conditions) in or under or on which the Work is done being different from that indicated or shown in the Contract Documents or from what was estimated or expected, or on account of the weather, elements, or other causes.

G. The Contractor shall conduct his operations so as not to damage existing structures or work installed either by him or by other contractors. In case of any such damage resulting from his operations, he shall repair and make good as new the damaged portions at his own expense with the consent of the damaged party. In the event that consent is not given, the Contractor shall continue liable for the damage caused.

H. The Contractor shall be as fully responsible to the Owner for the acts and omissions of his subcontractors, their officers, agents, servants and employees as he is for his own acts and omissions and those of his own officers, agents, servants and employees.

I. Should the Contractor sustain any loss, damage or delay through any act or omission of any other contractor or any subcontractor of any such other contractor, the Contractor shall have no claim against the Owner therefor, other than for an extension of time, but shall have recourse solely to such other contractor or subcontractor.

J. If any other contractor or any subcontractor of any such other contractor shall suffer or claim to have suffered loss, damage or delay by reason of the acts or omissions of the contractor or of any of his

subcontractors, the Contractor agrees to assume the defense against any such claim and to reimburse such other contractor or subcontractor for such loss or damage.

K. The Contractor agrees to and does hereby indemnify and save harmless the Owner from and against any and all claims by such other contractors or subcontractors alleging such loss, damage or delay from and against any and all claims, demands, suits, proceedings, liabilities, judgments, awards, losses, damages, costs and expenses, including attorneys' fees, arising out of, relating to or resulting from such claims.

L. The Contractor shall promptly pay all federal, state and local taxes which may be assessed against him in connection with the Work or his operations under the AGREEMENT and/or the other Contract Documents, including, but not limited to, taxes attributable to the purchase of material and equipment, to the performance of services, and the employment of persons in the prosecution of the Work.

M. Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material

1. The Owner shall be responsible for any Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material uncovered or revealed at the site which was not shown or indicated in Drawings or Specification or identified in the Contract Documents to be within the scope of the Work and which may present a substantial danger to persons or property exposed thereto in connection with the Work at the site. The Owner shall not be responsible for any such materials brought to the site by the Contractor, Subcontractors, Suppliers or anyone else for whom the Contractor is responsible.

2. To the fullest extent permitted by Laws and Regulations, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Engineer, Engineer's Consultants and the officers, directors, employees, agents other consultants and subcontractors of each and any of them from and against all claims, costs, losses and damages arising out of or resulting from such hazardous condition, provided that: (i) any such claim, cost, loss or damage is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, and (ii) nothing in this subparagraph shall obligate the Owner to indemnify any person or entity from and against the consequences of that person's or entity's own negligence.

1.04 AUTHORITY OF THE ENGINEER

A. The Engineer shall be the sole judge of the intent and meaning of the Drawings and Specifications and his decisions thereon and his interpretation thereof shall be final, conclusive and binding on all parties.

B. The Engineer shall be the Owner's representative during the life of the Contract and he shall observe the Work in progress on behalf of the Owner. He shall have authority (1) to act on behalf of the Owner to the extent expressly provided in the Contract or otherwise in writing; (2) to determine the amount, quality, acceptability and fitness of all work, materials and equipment required by the Contract; and (3) to decide all questions which arise in relation to the Work, the execution thereof, and the fulfillment of the Contract.

C. The Contractor shall proceed without delay to perform the work as directed, instructed, determined or decided by the Engineer and shall comply promptly with such directions, instructions, determinations or decisions. If the Contractor has any objection thereto he may, within ten (10) days of having received any such direction, instruction, determination or decision, require that any such direction, instruction, determination or decision be put in writing and within ten (10) days after receipt of any such writing he may file a written protest with the Owner stating clearly and in detail his objections, the reasons therefor, and the nature and amount of additional compensation, if any, to which he claims he will be entitled thereby. A copy of such protest shall be filed with the Engineer at the same time it is filed with the Owner. Unless the Contractor requires that any such direction, instruction, determination or decision be put in writing within ten (10) days of having received such direction, instruction, determination or decision and unless the Contractor files such written protest with the Owner and Engineer within such ten (10) day period, he shall be deemed to have waived all grounds for protest of such direction, instruction, determination, or decision and all claims for additional compensation or damages occasioned thereby, and shall further be deemed to have accepted such direction, instruction, determination, or decision as being fair, reasonable, and finally determinative of his obligations and rights under the Contract.

1.05 SUPERVISION OF WORK

A. The Contractor shall be solely responsible for supervision of the Work, shall give the work the constant attention necessary to ensure the expeditious and orderly progress thereof, and shall cooperate with the Engineer in every possible way.

B. At all times, the Contractor shall have his agent on the Work a competent superintendent capable of reading and thoroughly understanding the Drawings and Specifications, with full authority to execute the directions of the Engineer without delay and to supply promptly such labor, services, materials, equipment, plant, apparatus, appliances, tools, supplies and other items as may be required. Such superintendent shall not be removed from the Work without the prior written consent of the Engineer. If, in the opinion of the Engineer, the superintendent or any successor proves incompetent, the Contractor shall replace him with another person approved by the Engineer; such approval, however, shall in no way relieve or diminish the Contractor's responsibility for supervision of the Work.

C. Whenever the Contractor or his agent or superintendent is not present on any part of the Work where it may be necessary to give directions or instructions with respect to such work, such directions or instructions may be given by the Engineer to and shall be received and obeyed by the designated foreman or any other person in charge of the particular work involved.

1.06 INSURANCE

A. Before starting and until final completion and acceptance of the Work and expiration of the guarantee period provided for in the AGREEMENT the Contractor shall procure and maintain insurance of the types specified in paragraphs (1) to (11), inclusive, below, and to the limits for this insurance specified in Table A at the end of this section. All insurance shall be obtained from companies satisfactory to the Owner and Engineer.

B. Insurance shall be in such forms as will protect the Contractor from all claims and liability for damages for bodily and personal injury, including accidental death, and for property damage, which may arise from operations under the Contract, whether such operations be by himself, his subcontractors, or by anyone directly or indirectly employed or engaged by him.

C. The Town of Hopkinton, Massachusetts (Owner) and the Engineer shall be named as an "additionally insured".

D. All insurance policies provided by the Contractor shall include a "Waiver of Subrogation" endorsement for the Owner, Engineer and/or other third party entity.

E. The following types of insurance shall be provided on all policies:

1. Workmen's Compensation and Employer's Liability Insurance.

2. General Liability coverage, including Bodily Injury Insurance for operations and completed operations and Contractor's Protective Bodily Injury Insurance.

3. General Liability coverage, including Property Damage Insurance for operations and completed operations and Contractor's Protective Property Damage Insurance, each including coverage for injury to or destruction of wires or pipes and similar property and appurtenant apparatus and the collapse of or structural injury to any building or structure except those on which work under the Contract is being done. Blasting and explosion coverage shall be obtained if there is a need for blasting under the Contract, and no blasting shall be performed until such insurance has been secured.

4. Bodily Injury Insurance covering the operation of all motor vehicles owned by the Contractor.

5. Personal Injury Insurance to cover claims for personal injury and including claims brought by employees.

6. Property Damage Insurance covering the operation of all motor vehicles owned by the Contractor.

7. Insurance to cover bodily injuries and property damage resulting from the use of motor vehicles not owned by the Contractor, while such vehicles are being operated in connection with the prosecution of the Work.

8. Contractual Liability Insurance covering the liability assumed by the Contractor under the fifth paragraph of that subsection titled "Obligations and Liability of Contractor" of this AGREEMENT.

9. Owner's/Contractor's Protective Liability and Property Damage Insurance to protect the Owner and the Engineer against claims for Property damage and for bodily injuries, including accidental death, caused by the operations of the Contractor or his subcontractors on the Work. The policy shall indicate the Owner and the Engineer as the named insured. A copy of the policy shall be furnished to the Owner and a Certificate of Insurance shall be furnished to the Engineer.

10. Excess/Umbrella Liability Coverage shall be provided in accordance with the minimum limits stated in Table A.

11. Builders' Risk Insurance with an "All Risk" Installation Floater covering loss by fire and extended

coverage in the completed value form in the amount of the total insurable value of all structures, materials, and equipment to be built and installed. The insurance shall be obtained from a company satisfactory to the Owner. The policy shall indicate Owner, the Contractor, all subcontractors, and the Engineer as the named insured with loss payable to the Owner as Trustee. The policy shall provide for a 30-day notice to the Owner of cancellation or restrictive amendment. A copy of the policy shall be furnished to the Owner and a Certificate of Insurance shall be furnished to the Engineer. The insurance shall be obtained before the work is started and shall be maintained until the date of completion of the work as stated in the final estimate, or until the Owner occupies or otherwise take possession of the structure, whichever occurs first.

F. All policies shall be so written that the Owner will be notified in writing of cancellation or restrictive amendment at least 30 days prior to the effective date of such cancellation or amendment.

G. Certificates from the Contractor's insurance carriers stating the coverage provided, the limits of liability, and expiration dates shall be filed in triplicate with the Owner before operations are begun.

H. Certificates from the contractor naming the Owner, Town of Hopkinton, Massachusetts and the Engineer as additionally insured must be received by the Owner prior to initiating the work.

I. Renewal certificates must be furnished by the Contractor prior to the expiration date of any of the initial insurances.

J. No insurance required or furnished hereunder shall in any way relieve the Contractor of or diminish any of his responsibilities, obligations and liabilities under the Contract.

1.07 PATENTS

A. The Contractor's attention is directed to the following "Patent Indemnity Clause" illustrating the format and/or required wording therefore which shall be used by all manufacturers and/or suppliers, as deemed necessary by the Owner and Engineer, as an Indemnification and Hold Harmless Agreement.

B. This Agreement shall be accepted and approved in form by the Owner and Engineer prior to the approval and/or installation of the product.

PATENT INDEMNIFICATION

"In consideration for their purchase and use of the (Name of product and/or equipment) manufactured by (name of Manufacturer) and for other good and valuable consideration, (Name of Manufacturer) agrees to defend and hold harmless (Name of Contractor), BETA Group, Inc., and the (Name of Owner), and their employees and agents, from and against any liability, loss, cost, expense or damage including reasonable attorneys' and accountants' fees incurred by these entities in defending or prosecuting any claim for such liability, loss, cost, expense or damage resulting or arising out of a claim that the use of the above mentioned product and/or equipment delivered hereunder directly infringes any United States Patent, provided that (Name of Manufacturer) is given authority, information, and assistance for the defense of such suit, and (Name of Manufacturer) shall pay all damages and costs assessed against the above named entities for the use of such produce and/or equipment provided, however, that this indemnification shall not apply to equipment of (Name of Contractor) design, and provided further that if the use of such product and/or equipment is enjoined in any suit, (Name of Manufacturer) shall at its own expense and its option either procure for (name of Contractor) the right to continue the normal use of such produce and/or equipment, replace said product and/or equipment, modify said equipment or refund the purchase price thereof; and provided further that (Name of Manufacturer) indemnity as to use shall not apply to infringement resulting from the use of the produce and/or equipment delivered hereunder in combination with other items where use of the product and/or equipment per se does not constitute infringement."

1.08 COMPLIANCE WITH LAWS

A. The Contractor shall keep himself fully informed of all existing and future federal, state, and local laws, ordinances, rules, and regulations affecting those engaged or employed on the Work, the materials and equipment used in the Work or the conduct of the Work, and of all orders, decrees and other requirements of bodies of tribunals having any jurisdiction or authority over the same. If any discrepancy or inconsistency is discovered in the Drawings, Specifications or other Contract Documents in relation to any such law, ordinance, rule, regulation, order, decree or other requirement, the Contractor shall forthwith report the same to the Engineer in writing. The Contractor shall at all times observe and comply with, and cause all his agents, with all such existing and future laws, ordinances, rules, regulations, orders, decrees and other requirements, and he shall protect, indemnify and save harmless the Owner, its officers,

agents, servants and employees, from and against any and all claims, demands, suits, proceedings, liabilities, judgements, penalties, losses, damages, costs and expenses, including attorneys' fees, arising from or based upon any violation or claimed violation of any such law, ordinance, rule, regulation, order, decree or other requirement, whether committed by the Contractor or any of his agents, servants, employees or subcontractors.

1.09 PROVISIONS REQUIRED BY LAW DEEMED INSERTED

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

1.10 PERMITS

A. The Contractor shall, at his own expense, take out and maintain all necessary permits from the county, municipal, or other public authorities; shall give the notices required by law; and shall post all bonds and pay all fees and charges incident to the due and lawful prosecution of the Work.

1.11 NOT TO SUBLET OR ASSIGN

A. The Contractor shall constantly give his personal attention to the faithful prosecution of the Work, shall keep the same under his personal control, shall not assign the Contract or sublet the Work or any part thereof without the previous written consent of the Owner, and shall not assign any of the moneys payable under the Contract, or his claim thereto, unless by and with the like written consent of the Owner and the Surety on the Contract Bonds. Any assignment or subletting in violation hereof shall be void and unenforceable.

B. The Contractor shall not sublet or assign work to a subcontractor(s), for a total in excess of fifty (50) percent of the Contract Price, without prior written approval of the Owner and Engineer.

C. The Contractor shall be fully responsible to the Owner for the acts and omissions of his subcontractors, suppliers, and of persons either directly or indirectly employed by them as he is for the acts and omissions of persons directly employed by him.

D. The Contractor shall cause appropriate provisions, and applicable State or Federal regulations, to be inserted in all subcontractors relative to the work to bind subcontractors to the Contractor by the terms of the Contract Documents insofar as applicable to the work of subcontractors, and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Contract Documents.

E. The Contractor's attention is directed to the fact that nothing contained in this Contract shall create any contractual relation between any subcontractor and the Owner.

1.12 DELAY BY OWNER

A. The Owner may delay the beginning of the Work or any part thereof if the necessary lands or rights-of-way for such work shall not have been obtained. The Contractor shall have no claim for additional compensation or damages on account of such delay, but shall be entitled only to any extension of time as hereinafter provided.

1.13 TIME FOR COMPLETION

A. The rate of progress shall be such that the Work shall be performed and completed in accordance with the Contract before the expiration of the time limit stipulated in Table A at the end of this section, except as otherwise expressly provided herein.

B. It is agreed that the rate of progress herein required has been purposely made low enough to allow for the ordinary and foreseeable delays incident to construction work of this character. No extension of time will be given for ordinary or foreseeable delays, inclement weather, or accidents and the occurrence of such will not relieve the Contractor from the necessity of maintaining this rate of progress and completing the Work within the stipulated time limit.

C. If delays are caused by acts of God, acts of Government, unavoidable strikes, extra work, or other cause or contingencies clearly beyond the control or responsibility of the Contractor, the Contractor may be entitled to additional time to perform and complete the Work, provided that the Contractor shall, within ten (10) days from the beginning of such delay notify the Owner in writing, with a copy to the Engineer, of the cause and particulars of the delay. Upon receipt of such notification, the Owner shall review and evaluate the cause and extent of the delay. If, under the terms of the AGREEMENT, the delay is properly excusable, the

Owner will, in writing, appropriately extend the time for completion of the Work. (This paragraph will be interpreted to include delays in receipt of equipment provided that the Contractor placed his order and submitted shop drawings for such equipment promptly after execution of the Contract, that he has shown due diligence in following the progress of the order, and that the time required for delivery is in accordance with conditions generally prevailing in the industry.) The Contractor agrees that he shall not have or assert any claim for nor shall he be entitled to any additional compensation or damages on account of such delays.

D. The time in which the Work is to be performed and completed is of the essence of this AGREEMENT.

1.14 LIQUIDATED DAMAGES

A. In case the Contractor fails to complete the Work satisfactorily on or before the date of completion fixed herein or as duly extended as hereinbefore provided, the Contractor agrees that the Owner shall deduct from the payments due the Contractor each month the sum set forth in Table A at the end of this section for each calendar day of delay, which sum is agreed upon not as a penalty, but as fixed and liquidated damages for each day of such delay. If the payments due the Contractor are less than the amount of such liquidated damages, said damages shall be deducted from any other moneys due or to become due the Contractor, and, in case such damages shall exceed the amount of all moneys due or to become due the Contractor, the Contractor or his Surety shall pay the balance to the Owner.

1.15 NIGHT, SATURDAY, SUNDAY AND HOLIDAY WORK

A. No work shall be done at night, on Saturday on Sunday or on a holiday except (1) usual protective work, such as pumping and the tending of lights, (2) work done in case of emergency threatening injury to persons or property, or (3) if all of the conditions set forth in the next paragraph below are met.

B. No work other than that included in (1) and (2) above shall be done at night except when (a) in the sole judgment of the Owner, the work will be of advantage to the Owner and can be performed satisfactorily at night, (b) the work will be done by a crew organized for regular and continuous night work, and (c) in the sole judgment of the Owner and Engineer, adequate noise prevention measures are incorporated into the Work by the Contractor to minimize any noise impact within the work area and (d) the Owner has given written permission for such night work. The

Contractor is responsible for obtaining all permits and approvals required.

1.16 EMPLOY COMPETENT PERSONS

A. The Contractor shall employ only competent persons on the Work and shall not employ persons or means which may cause strikes, work stoppages or any disturbances by persons employed by the Contractor, any subcontractor, the Owner, the Engineer or any other contractor. Whenever the Engineer notifies the Contractor in writing that in his opinion any person on the Work is incompetent, unfaithful, disorderly, or otherwise unsatisfactory, or not employed in accordance with the provisions of the Contract, such person shall be discharged from the Work and shall not again be employed on it, except with the written consent of the Engineer.

1.17 EMPLOY SUFFICIENT LABOR AND EQUIPMENT

A. If in the sole judgment of the Engineer the Contractor is not employing sufficient labor, plant, equipment or other means to complete the Work within the time specified, the Engineer may, after giving written notice, require the Contractor to employ such additional labor, plant, equipment and other means as the Engineer deems necessary to enable the Work to progress properly.

1.18 INTOXICATING LIQUORS AND/OR DRUGS

A. The Contractor shall not sell and shall neither permit nor suffer the introduction and/or use of intoxicating liquors and/or drugs upon or about the Work.

1.19 ACCESS TO WORK

A. The Owner, the Engineer, and their officers, agents, servants and employees may at any and all times and for any and all purposes, enter upon the Work and the site thereof and the premises used by the Contractor, and the Contractor shall at all times provide safe and proper facilities therefor.

1.20 EXAMINATION OF WORK

A. The Engineer shall be furnished by the Contractor with every reasonable facility for examining and inspecting the Work and for ascertaining that the Work is being performed in accordance with the requirements and intent of the Contract, even to the extent of

requiring the uncovering or taking down portions of furnished work by the Contractor.

B. Should the work thus uncovered or taken down prove satisfactory, the cost of uncovering or taking down and the replacement thereof shall be considered as extra work unless the original work was done in violation of the Contract in point of time or in the absence of the Engineer or his inspector and without his written authorization, which case said cost shall be borne by the Contractor. Should the work uncovered or taken down prove unsatisfactory, said cost shall likewise borne by the Contractor.

C. Examination of inspection of the Work shall not relieve the Contractor of any of his obligations to perform and complete the Work as required by the Contract.

1.21 DEFECTIVE WORK, ETC.

A. Until acceptance and during the applicable guarantee period thereafter, the Contractor shall promptly, without charge, repair, correct or replace work, equipment, materials, apparatus or parts thereof which are defective, damaged or unsuitable or which in any way fail to comply with or be in strict accordance with the provisions and requirements of the Contract or applicable guarantee and shall pay to the Owner all resulting costs, expenses, losses or damages suffered by the Owner.

B. If any material, equipment, apparatus or other items brought upon the site for use or incorporation in the Work, or selected for the same, is rejected by the Engineer as unsuitable or not in conformity with the Specifications or any of the other Contract Documents, the Contractor shall forthwith remove such materials, equipment, apparatus and other items from the site of the Work and shall at his own cost and expense make good and replace the same and any material furnished by the Owner which shall be damaged or rendered defective by the handling or improper installation by the Contractor, his agents, servants, employees or subcontractors.

1.22 PROTECTION AGAINST WATER AND STORM

A. The Contractor shall take all precautions necessary to prevent damage to the Work by storms or by water entering the site of the Work directly or through the ground. In case of damage by storm or water, the Contractor shall at his own cost and expense make such repairs or replacements or rebuild such parts of the

Work as the Engineer may require in order that the finished Work may be completed as required by the Contract.

1.23 RIGHT TO MATERIALS

A. Nothing in the Contract shall be construed as vesting in the Contractor any right of property in the materials, equipment, apparatus and other items furnished after they have been installed or incorporated in or attached or affixed to the Work or the site, but all such materials, equipment, apparatus and other items shall, upon being so installed, incorporated, attached or affixed, become the property of the Owner. Nothing in this subsection shall relieve the Contractor of his duty to protect and maintain all such materials, equipment, apparatus and other items.

1.24 CHANGES

A. The Owner, through the Engineer, may make changes in the Work and in the Drawings and Specifications therefor by making alterations therein, additions thereto or omissions therefrom. All work resulting from such changes shall be performed and furnished under the pursuant to the terms and conditions of the Contract. If such changes result in an increase or decrease in the Work to be done hereunder, or increase or decrease the quantities thereof, adjustment in compensation shall be made therefor at the unit prices stipulated in the Contract for such work, except that if unit prices are not stipulated for such work, compensation for additional or increased work shall be made as provided hereinafter under the subsection titled "Extra Work"; and for eliminated or decreased work the Contractor shall allow the Owner a reasonable credit as determined by the Engineer.

B. Except in an emergency endangering life or property, no change shall be made unless in pursuance of a written order from the Engineer authorizing the change, and no claim for additional compensation shall be valid unless the change is so ordered.

C. The Contractor agrees that he shall neither have nor assert any claim for or be entitled to any additional compensation for damages or for loss of anticipated profits on work that is eliminated.

1.25 EXTRA WORK

A. The Contractor shall perform any extra work (work in connection with the Contract but not provided for herein) when and as ordered in writing by the Engineer, at the unit prices stipulated in the Contract

for such work or, if none are so stipulated, whether (a) at the price agreed upon before such work is commenced and named in the written order for such work, or (b) if the Engineer so elects, for the reasonable cost of such work, as determined by the contractor and approved by the Engineer, plus a percentage of such cost, as set forth below. No extra work shall be paid for unless specifically ordered as such in writing by the Engineer.

B. The Contractor shall submit claim for any extra work within fourteen (14) calendar days of performing said extra work.

C. The cost of extra work done under (b) above shall include the reasonable cost to the Contractor of materials used and equipment installed, common and skilled labor, and foremen, and the fair rental of all machinery and equipment used on the extra work for the period of such use.

D. At the request of the Engineer, the Contractor shall furnish itemized statements for the cost of the extra work ordered as above and give the Engineer access to all records, accounts, bills and vouchers and correspondence relating thereto.

E. The Contractor may include in the cost of extra work the amounts of additional premiums, if any, (other than premiums on bonds) paid on the required insurance on account of such extra work, of Social Security or other direct assessments upon the Contractor's payroll by Federal or other properly authorized public agencies, and of other approved assessments when such assessments are not normally included in payments made by the Contractor directly to his employees, but in fact are, and are customarily recognized as, part of the cost of doing work.

F. The fair rental hourly rate for all machinery and equipment shall be based upon the most recent edition of "Rental Rate Blue Book" published by Equipment Watch or a similar publication approved by the Engineer. Hourly rental rates for machinery and equipment shall be developed by dividing the monthly Blue Book rates by 176 hours per month plus Estimated Hourly Operating Costs (FHWA rate). Rate Adjustment tables shall be utilized for equipment model year and region of operation. If said extra work requires the use of machinery or equipment not already on the site of the Work the cost of transportation, not exceeding a distance of 100 miles, of such machinery or equipment to and from the Work shall be added to the fair monthly rental; provided, however, that this shall not apply to machinery or equipment already

required to be furnished under the terms of the Contract.

G. The Contractor shall not include in the cost of extra work any cost or rental of small tools, building, or any portion of the time of the Contractor, his superintendent, or his office and engineering staff.

H. To the cost of extra work done by the Contractor's own forces under (b) above (determined as stated above), the Contractor may add 15 percent to cover his overhead, use of capital, the premium on the Bonds as assessed upon the amount of this extra work, and profit.

I. In the case of extra work done under (b) by a subcontractor the subcontractor shall compute, as above, his cost for the extra work, to which he may add 15 percent as in the case of the Contractor. The Contractor shall be allowed an additional 5 percent of the subcontractor's initial cost for the extra work prior to the 15 percent adjustment, to cover the costs of the Contractor's overhead use of capital, the premium on the Bonds as assessed upon the amount of this work, and profit. Said subcontractor's cost must be reasonable and approved by the Engineer.

J. If extra work is done under (b) above, the Contractor and/or subcontractor shall keep daily records of such extra work. The daily record shall include the names of men employed, the nature of the work performed, and hours worked, materials and equipment incorporated, and machinery or equipment used, if any, in the prosecution of such extra work. This daily record, to constitute verification that the work was done, must be signed both by the Contractor's authorized representative and by the Engineer. A separate daily record shall be submitted for each Extra Work Order.

1.26 EXTENSION OF TIME ON ACCOUNT OF EXTRA WORK

A. When extra work is ordered near the completion of the Contract or at any time during the progress of the Work which unavoidably increases the time for the completion of the Work, and extension of time shall be granted as hereinbefore provided.

1.27 CHANGES NOT TO AFFECT BONDS

A. It is distinctly agreed and understood that any changes made in the Work or the Drawings or Specifications therefor (whether such changes increase or decrease the amount thereof or the time required for

its performance) or any changes in the manner of time of payments made by the Owner to the Contractor, or any other modifications of the Contract, shall in no way annul, release, diminish or affect the liability of the Surety on the CONTRACT BONDS given by the Contractor, it being the intent hereof that notwithstanding such changes the liability of the Surety on said bonds continue and remain in full force and effect.

1.28 CLAIMS FOR DAMAGES

A. If the Contractor makes claim for any damages alleged to have been sustained by breach of contract or otherwise, he shall, within ten (10) days after occurrence of the alleged breach or within ten (10) days after such damages are alleged to have been sustained, whichever date is the earlier, file with the Engineer a written, itemized statement of the details of the alleged breach and the details and amount of the alleged damages. The Contractor agrees that unless such statement is made and filed as so required, his claim for damages shall be deemed waived, invalid and unenforceable, and that he shall not be entitled to any compensation for any such alleged damages. Within ten (10) days after the timely filing of such statement, the Engineer shall file with the Owner a copy of the statement, together with his recommendations for action by the Owner.

B. The Contractor shall not be entitled to claim any additional compensation for damages by reason of any direction instruction, determination or decision of the Engineer, nor shall any such claims be considered, unless the Contractor shall have complied in all respects with the Article titled "Authority of the Engineer", including, but not limited to the filing of a written protest in the manner and within the time therein provided.

1.29 ABANDONMENT OF WORK OR OTHER DEFAULT

A. If the Work shall be abandoned, or any part thereof shall be sublet without previous written consent of the Owner, or the Contract or any moneys payable hereunder shall be assigned otherwise than as herein specified, or if at any time the Engineer shall be of the opinion, and shall so certify in writing, that the conditions herein specified as to rate of progress are not being complied with, or that the Work or any part thereof is being unnecessarily or unreasonably delayed, or that the Contractor has violated or is in default under any of the provisions of the Contract, or if the Contractor becomes bankrupt or insolvent or goes or is put into liquidation or dissolution, either voluntarily or

involuntarily, or petitions for an arrangement or reorganization under the Bankruptcy Act, or makes a general assignment for the benefit of creditors or otherwise acknowledges insolvency, the happening of any of which shall be and constitute a default under the Contract, the Owner may notify the Contractor in writing, with a copy of such notice mailed to the Surety, to discontinue all Work or any part thereof; thereupon the Contractor shall discontinue such Work or such part thereof as the Owner may designate; and the Owner may, upon giving such notice, by contract or otherwise as it may determine, complete the Work or such part thereof and charge the entire cost and expense of so completing the Work or such part thereof to the Contractor. In addition to the said entire cost and expense of completing the Work, the Owner shall be entitled to reimbursement from the Contractor and the Contractor agrees to pay to the Owner any losses, damages, costs and expenses, including attorney's fees, sustained or incurred by the Owner by reason of any of the foregoing causes. For the purposes of such completion the Owner may for itself or for any Contractors employed by the Owner take possession of and use or cause to be used any and all materials, equipment, plant, machinery, appliances, tools, supplies and such other items of every description that may be found or located at the site of the Work.

B. All costs, expenses, losses, damages, attorney's fees and any and all other charges incurred by the Owner under this subsection shall be charged against the Contractor and deducted and/or paid by the Owner out of any moneys due of payable or to become due or payable under the Contract to the Contractor; in computing the amounts chargeable to the Contractor the Owner shall not be held to a basis of the lowest prices for which the completion of the Work or any part thereof might have been accomplished, but all sums actually paid or obligated therefor to effect its prompt completion shall be charged to and against the account of the Contractor. In case the costs, expenses, losses, damages, attorney's fees and other charges together with all payments theretofore made to or for the account of the Contractor are less than the sum which would have been payable under the Contract if the Work had been properly performed and completed by the Contractor, the Contractor shall be entitled to receive the difference, and, in case such costs, expenses, losses, damages, attorneys' fees and other charges, together with all payments theretofore made to or for the account of the Contractor, shall exceed the said sum, the Contractor shall pay the amount of the excess to the Owner.

1.30 PRICES FOR WORK

A. The Owner shall pay and the Contractor shall receive the prices stipulated in the BID made a part hereof as full compensation for everything performed and furnished and for all risks and obligations undertaken by the Contractor under and as required by the Contract.

1.31 MONEYS MAY BE RETAINED

A. The Owner may at any time retain from any moneys which would otherwise be payable hereunder so much thereof as the Owner may deem necessary to complete the Work hereunder and to reimburse it for all costs, expenses, losses, damage and damages chargeable to the Contractor hereunder, in accordance with the States General Laws.

1.32 FORMAL ACCEPTANCE

A. This Agreement constitutes an entire contract for one whole and complete Work or result. Fixing of the date of completion and acceptance of the Work or a specified part thereof shall only be effective when accomplished by a writing specifically so stating and signed by the Owner.

1.33 PROGRESS ESTIMATES

A. Once a month, except as hereinafter provided, the Engineer shall make an estimate in writing of the total amount and value of the work done to the first of the month by the Contractor. The Owner shall retain a percentage of such estimated value, as set forth in Table A at the end of this section, as part security for fulfillment of the Contract by the Contractor and shall deduct from the balance all previous payments made to the Contractor, all sums chargeable against the Contractor and all sums to be retained under the provisions of the Contract.

B. Estimates of lump-sum items shall be based on a schedule dividing each such item into its appropriate component parts together with a quantity and a unit price for each part so that the sum of the products of prices and quantities will equal the Contract price for the item. This schedule must be submitted by the Contractor for and must have the approval of the Engineer before the first estimate becomes due.

C. If the Engineer determines that the progress of the Work will be benefited by the delivery to the site of certain materials and equipment, when available, in advance of actual requirement therefor and if such materials and equipment are delivered and properly

stored, protected and insured as determined by the Engineer, the cost to the Contractor or subcontractor as established by invoices or other suitable vouchers satisfactory to the Engineer, less the retained percentages as above provided, may be included in the progress estimates; provided always that there be duly executed and delivered by the Contractor to the Engineer at the same time a Bill of Sale in form satisfactory to the Owner, transferring and assigning to the Owner full ownership and title to such materials or equipment.

D. The Owner shall pay monthly to the Contractor in accordance with General Laws Chapter 30, Section 39, as amended:

1. Within fifteen (15) days (twenty-four (24) days in the case of the Commonwealth) after receipt from the Contractor, at the place designated by the Owner if such a place is so designated, of a periodic estimate requesting payment of the amount due for the preceding month, the Owner will make periodic payment to the Contractor for the work performed during the preceding month and for the materials not incorporated in the work but delivered and suitably stored at the site (or at some location agreed upon in writing) to which the Contractor has title or to which a subcontractor has title and has authorized the Contractor to transfer title to the Owner, less (1) a retention based on its estimate of the fair value of its claims against the Contractor and less (2) a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section 39F and less (3) a retention not exceeding five percent of the approved amount of the periodic payment. After the receipt of a periodic estimate requesting final payment and within 65 days after (a) the Contractor fully completes the work or substantially completes the work so that the value of the work remaining to be done is, in the estimate of the awarding authority, less than one percent of original contract price, or (b) the Contractor substantially completes the work and the Owner takes possession for occupancy, whichever occurs first, the Owner shall pay the Contractor the entire balance due on the contract less (1) a retention based on its estimate of the fair value of its claims against the Contractor and of the cost of completing the incomplete and unsatisfactory items of work and less (2) a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section 39 F, or based on the record of payments by the Contractor to the subcontractors under this contract if such record of payment indicates that the Contractor has not paid subcontractors as provided in section 39 F. If the Owner fails to make payment as herein provided, there

shall be added to each such payment daily interest at the rate of three percentage points above the rediscount rate than charged by the Federal Reserve Bank of Boston commencing on the first day after said payment is due and continuing until payment delivered or mailed to the Contractor; provided, that no interest shall be due, in any event, on the amount due on periodic estimate for final payment until 15 days (24 days in the case of the Commonwealth) after receipt of such a periodic estimate from the Contractor, at the place designated by the Owner if such a place is so designated. The Contractor agrees to pay to each subcontractor a portion of any such interest in accordance with the amount due each subcontractor.

2. Forthwith after the Contractor receives payment on account of a periodic estimate, the Contractor shall pay to each subcontractor the amount paid for the labor performed and the materials furnished by that subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the Contractor.

3. Not later than the 65th day after each subcontractor substantially completes his work in accordance with the plans and specifications, the entire balance due under the subcontract less amounts retained by the Owner as the estimated cost of completing the incomplete and unsatisfactory items of work, shall be due the subcontractor; and the Owner shall pay that amount to the Contractor. The Contractor shall forthwith pay to the subcontractor the full amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the Contractor.

4. Each payment made by the Owner to the Contractor pursuant to subparagraphs (2) and (3) of this paragraph for the labor performed and the materials furnished by a subcontractor shall be made to the Contractor for the account of that subcontractor; and the Owner shall take reasonable steps to compel the Contractor to make each such payment to each such subcontractor. If the Owner has received a demand for direct payment from a subcontractor for any amount which has already been included in a payment to the Contractor or which is to be included in a payment to the Contractor for payment to the subcontractor as provided in subparagraphs (2) and (3), the Owner shall act upon the demand as provided in this section.

5. If, within 70 days after the subcontractor has substantially completed the subcontract work, the subcontractor has not received from the Contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the Contractor, less any amount retained by the Owner as the estimated cost of completing the incomplete and unsatisfactory items of work, the subcontractor may

demand direct payment of that balance from the Owner. The demand shall be by a sworn statement delivered to or sent by certified mail to the Owner, and a copy shall be delivered to or sent by certified mail to the Contractor at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of the subcontract work. Any demand made after substantial completion of the subcontract work shall be valid even if delivered or mailed prior to the 70th day after the subcontractor has substantially completed the subcontract work. Within ten days after the subcontractor has delivered or so mailed the demand to the Owner and delivered or so mailed a copy to the Contractor, the Contractor may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the Owner and a copy shall be delivered to or sent by certified mail to the subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract including any amount due for extra labor and materials furnished to the Contractor and of the amount due for each claim made by the Contractor against the subcontractor.

6. Within 15 days after receipt of the demand by the Owner, but in no event prior to the 17th day after substantial completion of the subcontract work, the Owner shall make direct payment to the subcontractor of the balance due under the subcontract including any amount due for extra labor and materials furnished to the Contractor, less any amount (i) retained by the Owner as the estimated cost of completing the incomplete or unsatisfactory items of work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the Contractor in the sworn reply; provided, that the Owner shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by subparagraph (5). The Owner shall make further direct payments to the subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this subparagraph.

7. The Owner shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of subparagraph (6) in an interest-bearing joint account in the names of the Contractor and the subcontractor in a bank in Massachusetts selected by the Owner or agreed upon by the Contractor and the subcontractor and shall notify the Contractor and the subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the Contractor and the subcontractor or as determined by decree of a court of competent jurisdiction.

8. All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to subparagraph (7) shall be made out of amounts payable to the Contractor at the time of receipt of a demand for direct payment from a subcontractor and out of amounts which later become payable to the Contractor and in the order of receipt of such demands from subcontractors. All direct payments shall discharge the obligation of the Owner to the Contractor to the extent of such payment.

9. The Owner shall deduct from payments to a Contractor amounts which, together with the deposits in interest-bearing accounts pursuant to subparagraph (7), are sufficient to satisfy all unpaid balances of demands for direct payment received from subcontractors. All such amounts shall be earmarked for such direct payments, and the subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the Contractor.

10. If the subcontractor does not receive payment as provided in subparagraph (2) or if the Contractor does not submit a periodic estimate for the value of the labor or materials performed or furnished by the subcontractor and the subcontractor does not receive payment for same when due less the deductions provided for in subparagraph (2), the subcontractor may demand direct payment by following the procedure in subparagraph (5) and the Contractor may file a sworn reply as provided in that same subparagraph. A demand made after the first day of the month following that for which the subcontractor seeks payment shall be valid even if delivered or mailed prior to the time payment was due on a periodic estimate from the Contractor. Thereafter the Owner shall proceed as provided in subparagraph (6), (7), (8), and (9).

11. "Subcontractor" as used in subparagraph 10, shall mean a person who files a sub-bid and receives a subcontract as a result of that filed subbid or who is approved by the Owner in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the Contractor.

1.34 PARTIAL ACCEPTANCE

A. The Owner may, at any time in a written order to the Contractor (1) declare that he intends to use a specified part of the Work which in his opinion is sufficiently complete, in accordance with the Contract Documents, to permit its use; (2) enclose a tentative list of items remaining to be completed or corrected, and (3) fix the date of acceptance of that specified part of the Work.

B. Within 45 days after acceptance under this subsection, the Engineer shall make an estimate in writing of the amount and value of the part of the Work so accepted. The Owner shall pay said amount to the Contractor after deducting therefrom all previous payments, all charges against the Contractor as provided for hereunder, and all amounts to be retained under the provisions of the Contract, said payment to be made at the time of the next monthly progress estimate.

C. Acceptance by the Owner under this subsection shall not relieve the Contractor of any obligations under the Contract Documents except to the extent agreed upon in writing between the Owner and the Contractor.

D. The Owner shall have the right to exclude the Contractor from any part of the Work which has been accepted, but the Owner will allow the Contractor reasonable access thereto to complete or correct items on the tentative list.

1.35 FINAL ESTIMATE AND PAYMENT

A. As soon as practicable (but not more than sixty-five (65) days after final completion of the Work), the Engineer shall make a final estimate in writing of the quantity of Work done under the Contract and the amount earned by the Contractor.

B. The Owner shall pay to the Contractor the entire amount found by the Engineer to be earned and due hereunder after deducting therefrom all previous payments, all charges against the Contractor as provided for hereunder, and all amounts to be retained under the provisions of the Contract. Except as in this subsection otherwise provided, such payment shall be made not later than fifteen (15) days after but in no event before, the expiration of the time within which claims for labor performed or materials or equipment furnished must be filed under the applicable Lien Law, or, if such time is not specified by law, the expiration of thirty (30) days after the completion of the Engineer's final estimate.

C. All quantities shown on progress estimates and all prior payments shall be subject to correction in the final estimate and payment as determined by the Engineer.

D. The acceptance by the Contractor of final payment shall be and shall operate as a release to the Owner of all claims and all liability to the Contractor under or by virtue of this Agreement; and upon satisfactory

completion of the work performed under this Agreement, as a condition before final payment under this Agreement or as a termination settlement under this Agreement the Contractor shall execute and deliver to the Owner a release of all claims against the Owner arising under or by virtue of, this Agreement, except claims which are specifically exempted by the Contractor to be set forth herein. Unless otherwise provided in this Agreement, by State law or otherwise expressly agreed to be the parties to this Agreement, any payment, including final payment under, this Agreement or settlement upon termination of this Agreement shall not constitute a waiver of the Owner's claims against the Contractor or his sureties under this Agreement or applicable Performance and Labor and Materials Bonds.

1.36 LIENS

A. If at any time any notices of lien are filed and labor performed or materials or equipment manufactured, furnished, or delivered to or for the Work, the Contractor shall, at its own cost and expense, promptly discharge, remove or otherwise dispose of the same, and until such discharge, removal or disposition, the Owner shall have the right to retain from any moneys payable hereunder an amount which, in its sole judgement, it deems necessary to satisfy such liens and pay the costs and expenses, including attorneys' fees, of defending any actions brought to enforce the same, or incurred in connection therewith or by reason thereof.

1.37 CLAIMS

A. If at any time there be any evidence of any claims for which the Contractor is or may be liable or responsible hereunder, the Contractor shall promptly settle or otherwise dispose of the same, and until such claims are settled or disposed of, the Owner may retain from any moneys which would otherwise be payable hereunder so much thereof as, in its sole judgement, it may deem necessary to settle or otherwise dispose of such claims and to pay the costs and expenses, including attorney's fees, of defending any actions brought to enforce such claims, or incurred in connection therewith or by reason thereof.

1.38 APPLICATION OF MONEYS RETAINED

A. The Owner may apply any moneys retained hereunder to reimburse itself for any and all costs, expenses, losses, damage and damages, liabilities, suits, judgements and awards incurred, suffered or

sustained by the Owner and chargeable to the Contractor hereunder or as determined hereunder.

1.39 NO WAIVER

A. Neither the inspection by the Owner or the Engineer, nor any order, measurement, approval, determination, decision or certificate by the Engineer, nor any order by the Owner for the payment of money, nor any payment for or use, occupancy, possession or acceptance of the whole or any part of the Work by the Owner, nor any extension of time, nor any other act or omission of the Owner or of the Engineer shall constitute or be deemed to be an acceptance of any defective or improper work, materials, or equipment nor operate as a waiver of any requirement or provision of the Contract, nor of any remedy, power or right of or herein reserved to the Owner, nor of any right to damages for breach of contract. Any and all rights and/or remedies provided for in the Contract are intended and shall be construed to be cumulative; and, in addition to each and every other right and remedy provided for herein or by law, the Owner shall be entitled as of right to a writ of injunction against any breach or threatened breach of the Contract by the Contractor, by his subcontractors or by any other person or persons.

1.40 LIABILITY OF OWNER

A. No person, firm or corporation, other than the Contractor who signed this Contract as such, shall have any interest herein or right hereunder. No claim shall be made or be valid either against the Owner or any agent of the Owner and neither the Owner nor any agent of the Owner shall be liable for or be held to pay any money, except as herein provided. The acceptance by the Contractor of the payment as fixed in the final estimate shall operate as and shall be a full and complete release of the Owner and of every agent of the Owner of and from any and all claims, demands, damages and liabilities of, by or to the Contractor for anything done or furnished for or arising out of or relating to or by reason of the Work or for or on account of any act or neglect of the Owner or of an agent of the Owner or of any other person, arising out of, relating to or by reason of the Work, except the claim against the Owner for the unpaid balance, if any there be, of the amounts retained as herein provided.

1.41 GUARANTEE

A. The Contractor guarantees that the Work and services to be performed under the Contract, and all workmanship, materials and equipment performed, furnished, used or installed in the construction of the

same, shall be free from defects and flaws, and shall be performed and furnished in strict accordance with the Drawings, Specifications, and other Contract Documents, that the strength of all parts of all manufactured equipment shall be adequate and as specified and that the performance test requirements of the Contract shall be fulfilled. This guarantee shall be for a period of one year from and after the date of completion and acceptance of the Work as stated in the final estimate. If part of the Work is accepted in accordance with that subsection of this AGREEMENT titled "Partial Acceptance", the guarantee for that part of the Work shall be for a period of one year from the date fixed for such acceptance.

B. If at any time within the said period of guarantee any part of the Work requires repairing, correction or replacement, the Owner may notify the Contractor in writing to make the required repairs, correction, or replacements. If the Contractor neglects to commence making such repairs, correction, or replacements to the satisfaction of the Owner within three (3) days from the date of receipt of such notice, or having commenced fails to prosecute such Work with diligence, the Owner may employ other persons to make the same, and all direct and indirect costs of making said repairs, correction or replacements, including compensation for additional professional services, shall be paid by the Contractor.

1.42 RETURN OF DRAWINGS

A. All Drawings furnished by the Owner or the Engineer to the Contractor may be used only in connection with the prosecution of the Work and shall be returned by the Contractor upon completion of the Work.

1.43 CLEANING UP

A. The Contractor at all times shall keep the site of the Work free from rubbish and debris caused by his operations under the Contract. When the Work has been completed, the Contractor shall remove from the site of the Work all of his plant, machinery, tools, construction equipment, temporary work, and surplus materials so as to leave the Work and the site clean and ready for use.

1.44 LEGAL ADDRESS OF CONTRACTOR

A. The Contractor's business address and his office at or near the site of the Work are both hereby designated as places to which communications shall be delivered. The depositing of any letter, notice, or other communication in a postpaid wrapper directed to the

Contractor's business address in a post office box regularly maintained by the Post Office Department or the delivery at either designated address of any letter, notice, or other communication by mail or otherwise shall be deemed sufficient service thereof upon the Contractor, and the date of such service shall be the date of receipt. The first-named address may be changed at any time by an instrument in writing, executed and acknowledged by the Contractor delivered to the Engineer. Service of any notice, letter, or other communication upon the Contractor personally shall likewise be deemed sufficient service.

1.45 HEADINGS

A. The headings or titles of any section, subsection, paragraph, provision, or part of the Contract Documents shall not be deemed to limit or restrict the content, meaning or effect of such section, subsection, paragraph, provision or part.

1.46 MODIFICATION OR TERMINATION

A. Except as otherwise expressly provided herein, the Contract may not be modified or terminated except in writing signed by the parties hereto.

1.47 DIRECT LABOR COST

A. Direct labor cost percentage for change orders shall be ____ percent. (Direct labor cost percent shall be established following award and prior to execution of the Contract).

1.48 MASSACHUSETTS TAX LAWS

A. The Contractor shall provide a statement that indicates compliance with all the requirements of Massachusetts General Law Chapter 62C.

1.49 MINORITY BUSINESS

A. ~~N/A The goal for minority business enterprise (MBE/WBE) participation for this contract is a minimum of ____ percent (____%) MBE and ____ percent (____%) WBE participation, on the basis of the total dollars paid. The Contractor shall take all affirmative steps necessary to achieve this goal, and shall provide reports documenting the portion of contract and subcontract dollars paid to minority businesses, and its efforts to achieve the goals, with each invoice submitted or at such greater intervals as specified by the Town. The Contractor shall require similar reports from its subcontractors.~~

1.50 TERMINATION FOR CONVENIENCE

A. This Agreement may be terminated by the Owner upon not less than seven days' written notice for the Owner's convenience. In the case of termination for convenience, the Owner shall be responsible for amounts due the Contractor for work performed through the date of termination, provided that the Contractor shall submit a request for payment in accordance with the provisions hereof. The Contractor shall have no other claim for payments due with respect to such termination including any claim for lost profits with respect to the balance of the project.

1.51 EQUAL EMPLOYMENT OPPORTUNITY, ANTIDISCRIMINATION AND AFFIRMATIVE ACTION

A. The Contractor shall not discriminate against or exclude any person from participation herein on grounds of race, religion, color, sex, age, or national origin; and that it shall take affirmative actions to insure that applicants are employed, and that employees are treated during their employment, without regard to race, religion, color, sex, age, handicapped status, or national origin.

1.52 UNLAWFUL CONDUCT AND PARTICIPATION IN BOYCOTT

A. The Contractor shall not participate in or cooperate with an international boycott, as defined in Section 999 (b) (3) and (4) of the Internal Revenue Code of 1954, as amended, or engage in conduct declared to be unlawful by Section 2 of Chapter 151E of the Massachusetts General Laws.

IN WITNESS WHEREOF, the parties to this AGREEMENT have hereunto set their hands and seals, and have executed, or caused to be executed by their duly authorized officials, the AGREEMENT in Four (4) copies, each of which shall be deemed an original, as of the day and year first above-written.

WITNESSES

Hopkinton Public Schools School Committee
(Owner - party of the first part)

(SEAL)

BY: _____
(Signature)

(Title)

ATTEST:

(Signature)

(Contractor - party of the second part)

(SEAL)

BY: _____
(Signature)

(Title)

(Address)

ATTEST:

(Signature)

CERTIFICATE OF OWNER'S LEGAL COUNSEL

I, the undersigned, _____ the duly authorized and acting legal
representative of the _____, acting herein through its
_____, do hereby certify as follows:

I have examined the foregoing contract and surety bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with the terms, conditions, and provisions thereof.

By: _____
(Signature)

Date: _____

(Name)

(Title)

(Address)

(City, State, Postal code)

CERTIFICATE OF ACKNOWLEDGMENT OF CONTRACTOR IF A CORPORATION
For AGREEMENT

State of _____)

County _____)

on this _____ day of _____, 20 _____, before me personally

came _____ to me known, who being me duly

sworn, did depose and say as follows:

That he resides at _____

and is the _____

of _____

the corporation described in and which executed the foregoing instrument; that he knows the corporate seal of said corporation; that the seal affixed to the foregoing instrument is such corporate seal and it was so affixed by order of the Board of Directors of said corporation; and that by the like order he signed thereto his name and official designation.

Notary Public

(Seal)

My commission expires _____

TABLE A

Agreement Subsection Reference	Item	Minimum limits
1.06	Workman's Compensation and Employer's Liability Insurance	As required by the law of the State of Massachusetts
1.06	General Liability including Contractor's Protective, Completed Operations and Contractual Liability	Bodily Injury/Property Damage including C.U. Coverage <u>\$1,000,000</u> (Each Occurrence) <u>\$2,000,000</u> (Aggregate) Blasting and explosion coverage shall be obtained if there is a need for blasting under the contract.
1.06	Personal Injury Insurance	<u>\$2,000,000</u> (Aggregate)
1.06	Automobile Liability including coverage for owned, hired or borrowed vehicles	Bodily Injury/Property Damage <u>\$1,000,000</u> Combined Single Limit (Each Occurrence)
1.06	Owner's/Contractor's Protective (OCP) Liability & Property Damage	Bodily Injury/Property Damage <u>\$3,000,000</u> (Each Occurrence) <u>\$3,000,000</u> (Aggregate)
1.06	Excess/Umbrella Liability Coverage	<u>\$5,000,000</u> (Each Occurrence) <u>\$5,000,000</u> (Aggregate)
1.06	Builder's Risk Insurance (If Applicable)	Total insurable value of all structures, materials, and equipment to be built and installed.
1.13	a) Time of Completion - Total Contract Within 182 consecutive calendar days after the date specified in the Notice to Proceed no later than (April 1, 2026). On-site construction shall begin no earlier than June 1, 2026, and work shall be completed no later than September 29, 2026.	
1.14	Liquidated Damages for each consecutive calendar day of delay in completion time	\$ 300.00
1.33	Percentage of Progress Estimates to be Retained	5%

PERFORMANCE BOND

(NOTE: This Bond is issued simultaneously with the attached Labor and Materials Bond (Payment Bond) in favor of the Owner.)

KNOW ALL MEN BY THESE PRESENTS:

That we, _____
(an individual, a partnership, a corporation)

duly organized under the Laws of the Commonwealth of _____,

and having a usual place of business at _____,

as Principal, and _____, a corporation duly organized

under the Laws of the Commonwealth of _____,

and duly authorized to do business in the Commonwealth of Massachusetts,

and having a usual place of business at _____

as Surety, are holden and stand firmly bound and obligated unto Town of Hopkinton, Massachusetts, as obligee, in the sum of

lawful money of the United States of America, to and for the true payment whereof we bind ourselves and, each of us, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal, be means of a written AGREEMENT (which together with the Contract Documents in said AGREEMENT referred to are collectively sometimes referred to as the "Contract") dated _____, has entered into a contract with the said obligee "Hopkinton Public Schools Adaptive Playground" in the Town of Hopkinton, Massachusetts, a copy of which agreement is attached hereto and by references made a part hereof.

NOW THEREFORE, THE CONDITION of this obligation is such that if the Principal shall well and truly keep and fully and faithfully perform all of the terms and conditions of said AGREEMENT and of the "Contract Documents" referred to in said AGREEMENT (which collectively are hereinafter and in said AGREEMENT sometimes referred to as the "Contract") and all modifications thereof on the Principal's part to be performed, this obligation shall be void; otherwise it shall remain in full force and effect.

Whenever the said Principal shall be, and declared by the Owner to be, in default under the said Contract, the Owner having performed the Owner's obligations thereunder Surety, for value received, shall promptly remedy the default, or, at the option of the Owner, shall promptly.

- (a) Complete the said AGREEMENT and/or Contract in accordance with its terms and conditions, or

- (b) Obtain a bid or bids for submission to and the approval of the Owner for completing the said AGREEMENT and/or Contract and any modifications thereof in accordance with the terms and conditions thereof, and upon determination by the Owner and the Surety of the lowest responsible and acceptable bidder, arrange for a contract between such bidder and the Owner, and make available to the Owner as the work progresses (even though there should be default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less a sum that shall be equal to the difference between the Contract price as fixed and provided in said AGREEMENT and/or Contract or any modifications thereof to be paid thereunder to the Principal and the amount previously paid by the Owner to and/or for the account of and/or chargeable against the Principal, but not exceeding (including other costs and damages for which the Surety may be liable hereunder) the amount set forth in the first paragraph hereof.

The Surety, for value received, agrees further that no changes in, omissions from, or alterations, modifications or additions to the terms and provisions of said AGREEMENT and/or Contract or the Work to be performed thereunder, and that no extensions of time given or changes made in the manner or time of making payments thereunder, shall in any way effect the Surety's obligations on this bond, and the Surety hereby waives notice of any such changes, omissions, alterations, modifications, additions or extensions.

No right of action shall accrue on this Bond to or for the use of any persons other than the Owner named herein or the heirs, executors, administrators, successors and assigns of the Owner.

IN WITNESS WHEREOF, we have hereunto set our hands and seals to _____
_____ counterparts of this bond, this _____ day of _____,
in the year Two Thousand and _____.

Principal (SEAL)

Principal (SEAL)

Principal (SEAL)

Surety (SEAL)

Surety (SEAL)

NOTE:

If the Principal (Contractor) is a partnership, the Bond should be signed by each of the partners.

If the Principal (Contractor) is a corporation, the Bond should be signed in its correct corporate name by its duly authorized officer or officers.

If this Bond is signed on behalf of the Surety by an attorney-in-fact, there should be attached to it a duly certified copy of his power of attorney showing his authority to sign such Bonds.

There should be executed an appropriate number of counterparts of the Bond corresponding to the number of counterparts of the AGREEMENT.

Date of Bond must not be prior to the date of Contract.

Important

Surety Companies executing BONDS must appear on the U.S. Treasury Department's most current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts and be authorized to transact business in the state where the PROJECT is located.

The attention of the Surety Companies and Principal executing this Performance Bond is Directed to the fact that said Bond shall remain in full effect throughout the life of any guaranty or warranty periods stipulated in the Contract Documents and/or Agreement.

CERTIFICATE OF ACKNOWLEDGMENT OF CONTRACTOR IF A CORPORATION
For PERFORMANCE BOND

State of _____

County of _____

On this _____ day of _____, 20 _____, before
me personally came _____ to me known, who being by me duly
sworn, did depose and say as follows:

That he resides at _____

and is the _____

of _____

the corporation described in and which executed the foregoing instrument; that he knows the corporate seal of said corporation; that the seal affixed to the foregoing instrument is such corporate seal and it was so affixed by order of the Board of Directors of said corporation; and that by the like order he signed thereto his name and official designation.

Notary Public (Seal)

My commission expires _____

SECTION 00 61 16

LABOR AND MATERIALS BOND (PAYMENT BOND)

(NOTE: This Bond is issued simultaneously with the attached Performance Bonds in favor of the Owner.)

KNOW ALL MEN BY THESE PRESENTS:

That we, _____
(an individual, a partnership, a corporation)

duly organized under the Laws of the Commonwealth of _____,

having a usual place of business at _____,

as Principal, and _____ a corporation duly organized
under the Laws of the Commonwealth of _____,

and duly authorized to do business in the Commonwealth of Massachusetts,

and having a usual place of business at _____,
as Surety, are holden and stand firmly bound and obligated unto the Town of Hopkinton, Massachusetts,
as obligee, in the sum of

lawful money of the United States of America, to and for the true payment whereof we bind
ourselves and, each of us, our heirs, executors, administrators, successors, and assigns, jointly
and severally, firmly by these presents.

WHEREAS, the Principal, be means of a written AGREEMENT (which together with the Contract Documents in said AGREEMENT referred to are collectively sometimes referred to as the "Contract") dated _____, has entered into a contract with the said obligee for "Hopkinton Public Schools Adaptive Playground" in the Town of Hopkinton, Massachusetts, a copy of which agreement is attached hereto and by references made a part hereof.

NOW, THEREFORE, THE CONDITION of this obligation is such, that if the Principal shall promptly make payments to all claimants as hereinafter defined, for all labor performed or furnished and for all materials and equipment furnished for or used in or in connection with the Work called for by said AGREEMENT and/or Contract and any modifications thereof, including lumber used but not incorporated in said Work, and for the rental or hire of vehicles, tools and other appliances and equipment furnished for or used in connection with said Work, this obligation shall be void; otherwise it shall remain in full force and effect, subject, however, to the following conditions:

- (a) A claimant is defined as one having a direct contract with the Principal or with a subcontractor of the Principal for labor, materials and/or equipment used or reasonably required for use in the performance of the said Work, labor and materials being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental or

equipment directly applicable to the said AGREEMENT and/or Contract and any modifications thereof.

- (b) The above named Principal and Surety hereby jointly and severally agree with the Owner that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, or materials or equipment were furnished by such claimant, may sue on this bond for the use of such claimant, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon. The Owner shall not be liable for the payment of any costs or expenses of any such suit.
- (c) No suit or action shall be commenced hereunder by any claimant.

Unless claimant, other than one having a direct contract with the Principal, shall have given written notice to any two of the following: the Principal, the Owner, or the Surety above named, within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials or equipment for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials or equipment were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal, Owner or Surety at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the said Work is located, save that such service need not be made by a public officer;

After the expiration of one (1) year following the date on which the Principal ceased work on said AGREEMENT and/or Contract and any modifications thereof, it being understood, however, that if any limitation embodied in this bond is prohibited by any law controlling the construction hereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

Other than in a state court of competent jurisdiction in and for the county or other political subdivision of the State in which the said Work, or any part thereof, is situated, or in the United States District Court for the district in which the said Work, or any part thereof, is situated, and not elsewhere.

- (d) The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics liens which may be filed of record against said AGREEMENT and/Contract or said Work, whether or not claim for the amount of such lien be presented under and against this bond.

The surety, for value received, agrees further that no changes in, omissions from, or alterations, modifications or additions to the terms and provisions of said AGREEMENT and/or Contract or the Work to be performed thereunder, and that no extensions of time given or changes made in the manner or time of making payments thereunder, shall in any way affect the Surety's obligations on this Bond, and the Surety hereby waives notice of any such changes, omissions, alterations, modifications, additions or extensions.

IN WITNESS WHEREOF, we have hereunto set our hands and seals to _____
counterparts of this Bond, this _____ day of _____, in
the year Two Thousand and _____.

Principal (SEAL)

Principal (SEAL)

Principal (SEAL)

Surety (SEAL)

Surety (SEAL)

NOTE:

If the Principal (Contractor) is a partnership, the Bond should be signed by each of the partners.

If the Principal (Contractor) is a corporation, the Bond should be signed in its correct corporate name by its duly authorized officer or officers.

If this Bond is signed on behalf of the Surety by an attorney-in-fact, there should be attached to it a duly certified copy of his power of attorney showing his authority to sign such Bonds.

There should be executed an approximate number of counterparts of the Bond corresponding to the number of counterparts of the AGREEMENT.

Date of Bond must not be prior to the date of Contract.

Important

Surety Companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located.

The attention of the Surety Companies and Principal executing this Labor and Materials Bond is directed to the fact that said Bond shall remain in full effect throughout the life of any guaranty or warranty periods stipulated in the Contract Documents and/or Agreement.

CERTIFICATE OF ACKNOWLEDGMENT OF CONTRACTOR IF A CORPORATION
For LABOR AND MATERIALS BOND (PAYMENT BOND)

State of _____

County of _____

On this _____ day of _____, 20 _____, before
me personally came _____ to me known, who being by me duly
sworn, did depose and say as follows:

That he resides at _____

and is the _____

of _____

the corporation described in and which executed the foregoing instrument; that he knows the
corporate seal of said corporation; that the seal affixed to the foregoing instrument is such
corporate seal and it was so affixed by order of the Board of Directors of said corporation; and
that by the like order he signed thereto his name and official designation.

Notary Public (Seal)

My commission expires _____

STATE TAX CERTIFICATE

Pursuant to M.G.L., Ch. 62C, sec. 49A, I certify under the penalties of perjury that I, to the best of my knowledge and belief, have filed all state tax returns and paid all state taxes required under law.

Social Security Number *
Or Federal Identification Number *

Signature of Individual or
Corporate Name

by: _____
Corporate Office (if applicable)

* Submission of a Social Security Number or a Federal Identification Number is voluntary.

SECTION 00 72 00

GENERAL CONDITIONS

- 1.01 General Provisions
- 1.02 Definitions
- 1.03 Materials and Equipment
 - A. General
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 - C. Storage of Excavated Material
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 - E. Inspection Away from Site
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- 1.04 Contractor's Shop and Working Drawings
- 1.05 Occupying Private Land
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- 1.07 Safety
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- 1.09 Work to Conform
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- 1.17 Additional or Substitute Bonds
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- 1.20 Payments by Contractor
- 1.21 "Dig Safe" Law
- 1.22 Fire Prevention and Protection
- 1.23 Dust Control
- 1.24 Disposal of Debris
- 1.25 Night, Saturday, Sunday and Holiday Work
- 1.26 Length of Work Day
- 1.27 Hurricane Protection
- 1.28 Reduction in Scope of Work

1.01 GENERAL PROVISIONS

A. The duties and obligations imposed by these General Conditions will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply.

B. Sections of Division 1, General Requirements govern the execution of the Work of all sections of the specifications.

C. The Specifications are written in imperative and streamlined form. This imperative language is directed to the Contractor, unless stated otherwise.

1.02 DEFINITIONS

A. Wherever the words as listed in subsection 1.01 of the AGREEMENT or pronouns used in their stead occur in the Contract Documents, they shall have the meanings as given in the AGREEMENT.

1.03 MATERIALS AND EQUIPMENT

A. General

1. Unless otherwise provided in the Contract Documents, only new materials and equipment shall be incorporated in the Work.

2. As soon as possible after execution of the AGREEMENT, submit to the Engineer the names and addresses of the manufacturers and suppliers of all materials and equipment proposed to be incorporated into the Work.

3. When shop and working drawings are required as specified below, submit, prior to the submission of such drawings, data in sufficient detail to enable the Engineer to determine whether the manufacturer and/or the supplier have the ability to furnish a product meeting the Specifications.

4. Submit data relating to the materials and equipment proposed to be incorporated into the Work in sufficient detail to enable the Engineer to identify and evaluate the particular product and to determine whether it conforms to the Contract requirements. Such data shall be submitted in a manner similar to that specified for submission of shop and working drawings.

B. Handling

1. Handle, haul, and distribute materials and all surplus materials on the different portions of the Work, required to complete the Work in accordance with the Contract Documents.

2. Provide suitable storage room for materials and equipment during the progress of the Work, and be responsible for the protection, loss of, or damage to materials and equipment furnished under this Contract, until the final completion and acceptance of the Work.

3. Pay all storage and demurrage charges by transportation companies and vendors.

C. Storage of Excavated Material

1. Place excavated materials and equipment to be incorporated in the Work so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the Work.

2. Materials shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.

D. Inspection

1. All materials and equipment furnished by the Contractor to be incorporated in the Work shall be subject to the inspection of the Engineer.

2. No material shall be processed or fabricated for the Work or delivered to the work site without prior concurrence of the Engineer.

3. Facilities and labor for the storage, handling, and inspection of all materials and equipment shall be furnished by the Contractor.

4. Defective materials and equipment shall be removed immediately from the site of the Work.

E. Inspection away from Site

1. If work to be done, away from the construction site, is to be inspected on behalf of the Owner during its fabrication, manufacture, or testing, or before shipment, the Contractor shall give notice to the Engineer of the place and time where such fabrication, manufacture, testing, or shipping is to be done. Such notice shall be in writing and delivered to the Engineer in ample time, as determined solely by the Engineer, so that the necessary arrangements for the inspection can be made.

F. Samples

1. Submit samples of materials for tests, as the Engineer deems necessary to demonstrate conformance with the Specifications. Such samples,

including concrete test cylinders, shall be furnished, taken, stored, packed, and shipped by the Contractor as directed by the Engineer.

2. Furnish suitable molds for making concrete test cylinders. Except as otherwise expressly specified, the Owner shall make arrangements for, and pay for, the tests.

3. Pack samples so as to reach their destination in good condition, and label to indicate the material represented, the name of the building or work and location for which the material is intended, and the name of the Contractor submitting the sample. To ensure consideration of samples, notify the Engineer by letter that the samples have been shipped and properly describe the samples in the letter. Send letter of notification separate from the samples.

4. Submit data and samples, or place his orders, sufficiently early to permit consideration, inspection and testing before the materials and equipment are needed for incorporation in the Work. The consequences for failure to do so shall be the Contractor's sole responsibility.

5. In order to demonstrate the proficiency of workmen, or to facilitate the choice among several textures, types, finishes, surfaces, etc., provide such samples of workmanship of wall, floor, finish, etc., as may be required.

6. After review of the samples, data, etc. the materials and equipment used for the Work shall in all respects conform therewith.

G. Shop Testing

1. When required, furnish to the Engineer in triplicate, sworn copies of manufacturer's shop or mill tests (or reports from independent testing laboratories) relative to materials, equipment performance ratings, and concrete data.

1.04 CONTRACTOR'S SHOP AND WORKING DRAWINGS

A. Submit shop drawings to the Engineer for review and approval.

B. All submittals will be identified as the Engineer may require and in the number of copies also as required by the Engineer.

C. The data shown on the Shop Drawings will be complete regarding quantities, dimensions, specified performance and design criteria, materials and other

data as particular to the Work that the Contractor proposes to provide.

1.05 OCCUPYING PRIVATE LAND

A. Entering or occupying with men, tools, materials, or equipment, any land outside the rights-of-way or property of the Owner (except after written consent from the proper parties) will not be permitted. A copy of the written consent shall be given to the Engineer.

1.06 INTERFERENCE WITH AND PROTECTION OF STREETS

A. Obtain permits from the governing authorities prior to obstructing any portion of a street, road, or private way. If any street, road or private way is rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as ordered by the governing authorities.

B. Maintain streets, roads, private ways, and walks not closed in a passable and safe condition,

C. Provide at least 24 hours in advance, notice to the Owner, Police, Fire and School Departments in writing, with a copy to the Engineer, if the closure of a street or road is necessary. Cooperate with all Departments in the establishment of alternate routes and provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.

1.07 SAFETY

A. Take all precautions and provide safeguards to prevent personal injury and property damage. Provide protection for all persons including but not limited to employees and employees of other contractors and subcontractors; members of the public; and employees, agents and representatives of the Owner, the Engineer, and regulatory agencies that may be on or about the Work. Provide protection for all public and private property including but not limited to structures, pipes, and utilities, above and below ground.

B. Provide and maintain all safety equipment such as fences, barriers, signs, lights, walkways, guards and fire prevention and fire-fighting equipment.

C. Comply with all applicable Federal, State and local laws, ordinances, rules and regulations and lawful orders of all authorities having jurisdiction for the safety of persons and protection of property.

D. Designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This responsible person shall have the authority to take immediate action to correct unsafe or hazardous conditions and to enforce safety precautions and programs.

1.08 EXISTING FACILITIES

A. Dimensions of Existing Structures

1. Where the dimensions and locations of existing structures are of importance in the installation or connection of any part of the Work, verify such dimensions and locations in the field before the fabrication of any material or equipment which is dependent on the correctness of such information.

B. Proposed Pipe Location

1. Exterior pipelines will be located substantially as indicated on the Drawings, but the right is reserved to the Owner, acting through the Engineer, to make such modifications in location as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings, etc., are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him for laying and jointing different or additional items where required.

2. Small interior piping is indicated diagrammatically on the Drawings, and the exact location is to be determined in the field. Piping shall be arranged in a neat, compact, and workmanlike manner, with a minimum of crossing and interlacing, so as not to interfere with equipment or access way, and, in general, without diagonal runs.

C. Interference with Existing Works

1. Conduct operations so as to interfere as little as possible with existing works. Develop a program, in cooperation with the Engineer and interested officials, which shall provide for the construction and putting into service of the new works in the most orderly manner possible. This program shall be adhered to except as deviations therefrom are expressly permitted. All work of connecting with, cutting into, and reconstructing existing pipes or structures shall be planned to interfere with the

operation of the existing facilities for the shortest time when the demands on the facilities best permit such interference, even though it may be necessary to work outside of normal working hours to meet these requirements. Electrical connections should be coordinated with the Owner so as to minimize disruption of normal plant operations. Before starting work which will interfere with the operation of existing facilities, perform preparatory work and see that all tools, materials and equipment are made ready and at hand.

2. Repair utilities damaged by the Contractor's operations during the progress of the work, and be responsible for correcting all damages to existing utilities and structures at no additional expense to the Owner. Contact the proper utility or authority to correct or make any changes due to utility or other obstructions during the work but the entire responsibility and expense shall be with the Contractor.

3. Make such minor modifications in the work relating to existing structures as may be necessary, without additional compensation.

4. Submit no claim for additional compensation by reason of delay or inconvenience in adapting his operations to the need for continuous flow of sewage.

D. Existing Utilities or Connections

1. The location of existing underground pipes, conduits, and structures, as shown, has been collected from the best available sources. The Owner, together with its agents, does not imply nor guarantee the data and information in connection with underground pipes, conduits, structures and such other parts as to their completeness, nor their locations as indicated. The Contractor shall assume that there are existing water, sewer, gas and other utility connections to each and every building enroute, whether they appear on the drawings or not. An expense and/or delay occasioned by utilities and structures, or damage thereof, including those not shown, shall be the responsibility of the Contractor, at no additional expense to the Owner.

2. Above ground utilities may be present in the areas of the proposed Work. Take all necessary actions and/or precautions, including, but not limited to, utility company notification and necessary relocations (both temporary and permanent), to insure proper protection of those aboveground utilities and appurtenances to be affected by his operations. All costs associated with the aboveground utilities shall be paid by the Contractor at no additional expense to the Owner.

3. If and when encountered, existing utilities shall be properly supported and protected during the construction work and the Engineer shall be notified accordingly. The operation of existing utilities shall not be interrupted except with written permission of the operator and owner of such utilities. Allow ample time for all measures as may be required for the continuance of existing utility operations. Take extreme precautions to minimize disruption of utilities. Make prompt and full restitution for repairs by others for all disruptions caused by operations required to perform the Work.

4. Comply with all requirements of utility organizations involved.

E. Failure to Repair

1. Any emergency arising from the interruption of electric, telephone, gas, water, or sewer service due to the activities of the Contractor, shall be repaired by the Contractor as quickly as is possible.

2. If and when, in the opinion of the Owner, the Contractor is not initiating repair work as expeditiously as possible upon notification to do so, the Owner, may at his own option, make the necessary repairs using his own forces or those of others. The cost of such repairs shall be subtracted from the payments due to the Contractor.

F. Disturbance of Bounds

1. Replace all bounds disturbed during the construction operation, at no additional cost to the Owner. The bounds shall be relocated by a land surveyor approved by the Engineer and registered in the State that the Work is to be done.

1.09 WORK TO CONFORM

A. During its progress and on its completion, the Work shall conform to the lines, levels, and grades indicated on the Drawings or given by the Engineer and shall be built in strict accordance with the Contract Documents and the directions given from time to time by the Engineer.

B. All work done without instructions having been given therefore by the Engineer, without proper lines or levels, or performed during the absence of the Engineer, will not be estimated or paid for except when such work is authorized by the Engineer in writing. Work so done may be ordered uncovered or taken down, removed, and replaced at the Contractor's expense.

1.10 PLANNING AND PROGRESS SCHEDULES

A. Before starting the Work and from time to time during its progress, as the Engineer may request, the Contractor shall submit to the Engineer a written description of the methods he plans to use in doing the Work and the various steps he intends to take.

B. Within 14 calendar days after the date of formal execution of the AGREEMENT, the Contractor shall prepare and submit to the Engineer (a) a written schedule fixing the dates on which additional drawings, if any, will be needed by the Contractor and (b) a written schedule fixing the respective dates for the start and completion of various parts of the Work. Each such schedule shall be subject to review from time to time during the progress of the Work.

1.11 PRECAUTIONS DURING ADVERSE WEATHER

A. During adverse weather and against the possibility thereof, take all necessary precautions so that the Work may be properly done and satisfactory in all respects. When required by the manufacturer of the material or equipment to be installed, protection shall be provided by use of tarpaulins, wood and building-paper shelters, or other suitable means.

B. During cold weather, materials shall be preheated, if required, and the materials and adjacent structure into which they are to be incorporated shall be made and kept sufficiently warm so that a proper bond will take place and a proper curing, aging, or drying will result. Protected spaces shall be artificially heated by suitable means that will result in a moist or dry atmosphere according to the particular requirements of the work being protected. Ingredients for concrete and mortar shall be sufficiently heated so that the mixture will be warm throughout when used.

1.12 TEMPORARY HEAT

A. If temporary heat is required for the protection of the Work, provide and install suitable heating apparatus, provide adequate and proper fuel, and shall maintain heat as required.

B. Temporary heating apparatus shall be installed and operated in such manner that finished work will not be damaged.

1.13 ELECTRICAL ENERGY

A. Make all necessary applications and arrangements and pay all fees and charges for electrical energy for power and light necessary for the proper completion of the Work and during its entire progress. Provide and pay for all temporary wiring, switches, connections, and meters.

B. Provide sufficient electric lighting so that all work may be done in a workmanlike manner when there is not sufficient daylight.

1.14 CERTIFICATES OF CONFORMANCE

A. Furnish to the Engineer, in the manner as directed and prior to actual installation, notarized certificates of conformance for all materials to be furnished under this Contract. The notarized certificates of conformance shall state that the material to be furnished meets or exceeds all requirements specified under the Contract Documents. When so directed, the manufacturer's notarized certificates of conformance, certifying that the materials meet the requirements specified shall accompany each shipment of material. Unless otherwise specifically specified and/or directed by the Engineer, all testing of materials required under this Contract shall be provided by the Contractor at no additional expense to the Owner.

1.15 PATENTS

A. Pay, at no additional expense to the Owner, all applicable royalties and license fees associated with the materials and construction methods to be used under this Contract. Defend all suits or claims for infringements of any patent rights, and save the Owner and Engineer harmless from loss on account thereof, except that the Owner shall be responsible for any such loss when a particular process, design, or product of a particular manufacturer (s) is specifically specified with no option to the Contractor. However, if the Contractor has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the Owner.

B. Refer to Specification Section 00 52 13 Article 1.07, Patents, regarding the Contractor's responsibilities for any patent rights associated with the materials and construction methods to be used under this Contract.

1.16 "OR EQUAL" CLAUSE

A. Whenever a material or article required is specified or shown on the drawings by using the name of the proprietary product of a particular manufacturer or vendor, any material or article which will perform adequately, in the Engineer's sole judgment and/or opinion, the duties imposed by the general design may be considered equal and satisfactory providing the material or article so proposed is of equal substance. It shall not be purchased or installed without his written approval. In all cases new material shall be used in the project.

B. If more than one brand, name of material, device, or piece of equipment is shown or specified, each should be regarded as the equal of the other. Any other brand, make of material, device or equipment, which in the opinion of the OWNER and/or ENGINEER, is the recognized equal of that specified (considering quality, workmanship, and economy of operation), and is suitable for the purpose intended, may be accepted.

C. ENGINEER will be allowed a reasonable time within which to evaluate submittals for Substitute Items. ENGINEER will be the sole judge of acceptability. No "Or Equal" or Substitute Item will be ordered, installed or utilized without ENGINEER's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any "or equal" or substitute. ENGINEER will record time required by ENGINEER and ENGINEER's Consultants in evaluating substitutes proposed or submitted by CONTRACTOR and in making changes to the Contract Documents. Whether or not ENGINEER accepts a Substitute Item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed Substitute Item.

1.17 ADDITIONAL OR SUBSTITUTE BONDS

A. If at any time the Owner, for justifiable cause, shall be or become dissatisfied with any Surety or Sureties than upon the performance or payment bonds, the Contractor shall, within five (5) calendar days after notice from the Owner so to do, substitute an acceptable bond (or bonds) in such form and sum and signed by such other Surety or Sureties as may

be acceptable to the Owner. The Contractor shall pay the premiums on such bonds with no additional expense to the Owner. No further payments shall be deemed due nor will be made until the new Surety or Sureties shall have furnished such as acceptable bond to the Owner.

1.18 SEPARATE CONTRACTS

A. The Owner reserves the right to let other contracts in connection with the construction of the contemplated work of this project or contiguous projects of the Owner. The Contractor, therefore, will afford any such other contractors reasonable opportunity for the introductions and storage of their materials and the execution of their work, will properly connect and coordinate his work with theirs, and will not commit or permit any act which will interfere with the performance of their work.

B. Coordinate operations with those of other contractors. Cooperation will be required in the arrangement for the storage of materials and in the detailed execution of the work.

C. It is essential that all parties interested in the project cooperate to the end that the entire project will be brought to a successful conclusion as rapidly as possible, but the Owner cannot guarantee that no interference or delay will be caused thereby. Interference and delay resulting from such cooperation shall not be basis of claims against the Owner.

1.19 PAYROLLS OF CONTRACTOR AND SUBCONTRACTORS

A. The Contractor and each of his Subcontractors shall prepare his payrolls on forms prescribed and in accordance with instructions to be furnished by the Owner. Within seven (7) days after the regular payment date of the payroll, the Contractor shall deliver to the Owner, with copies to the Engineer, a certified legible copy or copies of each such payroll. Each such payroll shall contain the statement required by the Federal Regulations issued pursuant to the "Anti-Kickback Statute", (48 Stat. 948; 18 U.S.C. 874; 40 U.S.C. 276C).

B. Carrying any person on his payrolls not employed by him will not be permitted. Carrying employees of a subcontractor on his payrolls will not be permitted, but such employees must be carried on the payrolls of the employing subcontractor.

C. Each Contractor or Subcontractor shall preserve his weekly payroll records for a period of three (3) years from the date of completion of the Contract. The payroll records shall set out accurately and completely the name, occupational classification, and hourly wage rate of each employee, hours worked by him during the payroll period and full weekly wages earned by him, and deductions made from such weekly wages and the actual weekly wages paid to him. Such payroll records shall be made available at all times for inspection by the Owner or his authorized representatives, the Engineer or by agents of the United States Department of Labor.

1.20 PAYMENTS BY CONTRACTOR

A. Pay for all traffic control, safety, transportation and utility services not later than the 20th day of the calendar month following that in which services are rendered. Reimbursable costs for services rendered, as specified in the Contract Documents, shall not be incorporated into partial payment estimates until such time that the Contractor submits to the Engineer actual paid invoices from those in which services were rendered.

1.21 "DIG SAFE" LAW

A. Before proceeding with construction operations, the Contractor shall notify the State of Massachusetts Underground Plant Damage Prevention Systems (DIG SAFE at 811), and shall make such supplemental investigations, including exploratory excavations, by hand digging, as he deems necessary to uncover and determine the exact locations of utilities and structures, and shall have no claims for damages due to encountering subsurface structures or utilities in locations other than that shown on the drawings, or which were made known to the Contractor prior to construction operations. The Contractor shall be responsible and liable for all damages to the existing utilities and structures.

B. Before commencing with the construction of any work, identify any water main, gas main, telephone duct, electric duct, and/or other utility present which is or could be in conflict with the proposed work.

C. Relocation of the affected utilities shall be done as directed by the Owner and in accordance with the requirements of the utility company.

D. The attention of the Contractor is directed to the fact that certain utility companies may not fall under

the provisions of "DIG SAFE". Individual utility company notifications by the Contractor shall be necessary to ensure proper notification and protection of all existing utilities affected by this Contract.

1.22 FIRE PREVENTION AND PROTECTION

A. State and municipal rules and regulations with respect to fire prevention, fire-resistant construction and fire protection shall be strictly adhered to and all work and facilities necessary therefore shall be provided and maintained by the Contractor in an approved manner.

B. Provide fire protection equipment such as water tanks, hoses, pumps, extinguishers, and other materials, and apparatus, for the protection of the contract work, and adjacent property. Trained personnel experienced in the operation of all fire protection equipment and apparatus shall be available on the site whenever work is in progress, and at such other times as may be necessary for the safety of the public and the work.

1.23 DUST CONTROL

A. Exercise every precaution and means to prevent and control dust arising out of all construction operations from becoming a nuisance to abutting property owners or surrounding neighborhoods. Pavements adjoining pipe trench shall be kept clean of excess materials wherever and whenever directed by the Engineer. Repeated daily dust control treatment shall be provided to satisfactorily prevent the spread of dust until permanent pavement repairs are made and until earth stockpiles have been removed, and all construction operations that might cause dust have been completed. No extra payment will be made for dust control measures, compensation shall be considered to be included in the prices stipulated for the appropriate items as listed in the Bid.

1.24 DISPOSAL OF DEBRIS

A. The materials from the demolition, and those used in the construction of the Work throughout the project, shall be deposited in such a manner so as to not endanger persons or the Work, and so that free access may be had at any time to all hydrants, gates and existing equipment in the vicinity of the work. The materials shall be kept trimmed-up so as to be of as little inconvenience as possible to the public travel and plant operations. All excavated materials not approved for backfill and fill, all surplus material,

and all rock and boulders resulting from the excavations, shall be removed and satisfactorily disposed of off the site by the Contractor, at no additional expense to the Owner.

B. The materials being removed from the pipelines and manholes during the cleaning process shall be deposited in such a manner as to not endanger the public, plant personnel or persons performing the work. Such debris deposits may be of such nature, high in biological organic contents, or chemically aggressive that they will require proper disposal in a safe, health risk free, environment. Contact the Owner and Engineer and all agencies having jurisdiction thereof, for approval of debris disposal methods and locations of disposal, prior to disposing of any or all debris removed from pipe cleaning methods. All debris shall be removed and satisfactorily disposed of off the work site, at no additional expense to the Owner.

1.25 NIGHT, SATURDAY, SUNDAY AND HOLIDAY WORK

A. No work shall be done at night or on Saturdays, or Sundays or holidays without the prior written approval of the Owner and Engineer.

1.26 LENGTH OF WORK DAY

A. The Owner retains the right to restrict the Contractor to an eight-hour workday. Such restrictions shall not be the basis for damages or claims against the Owner.

B. The Contractor's attention is also directed to the fact that should it be deemed necessary to perform various items of work during off-peak flow or traffic hours, early morning or late night hours, then he shall

END OF SECTION

notify the Engineer a minimum of 24 hours in advance as to his intentions and reasons for the change in work hours. The Contractor shall be responsible for properly contacting and informing all involved parties of such a change in work hours. The Contractor shall not be entitled to any additional compensation from the Owner for any expenses that may be incurred by change of working hours and/or scheduling.

1.27 HURRICANE PROTECTION

A. Should hurricane warnings be issued, the Contractor shall take every practicable precaution to minimize danger to persons, to the work and to adjacent property. These precautions shall include closing all openings; removing all loose materials, tools and/or equipment from exposed locations; and removing or securing scaffolding and other temporary work.

1.28 REDUCTION IN SCOPE OF WORK

A. The Owner reserves the right to decrease the scope of the work to be done under this Contract and to omit any work should the Owner deem it to be in the public interest to do so. To this end, the Owner reserves the right to reduce the quantity of any items or omit all of any as set forth in the BID, either prior to executing the contract or at any time during the progress of the work. The Owner further reserves the right, at anytime during the progress of the work, to restore all or part of any items previously omitted or reduced. Exercise by the Owner of the above rights shall not constitute any ground or basis of claim for damages or for anticipated profits on the work omitted.

SECTION 00 73 00

SUPPLEMENTARY CONDITIONS

- 1.01 General
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1.01 GENERAL

A. These Supplementary Conditions are requirements which amend or supplement the General Conditions specified elsewhere.

B. The duties and obligations imposed by these Supplementary Conditions will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply.

C. Assertion of any claim for any additional compensation or damages on account of and/or the fulfillment of these Supplementary Conditions will not be allowed.

1.02 LIMITS OF NORMAL EXCAVATION

A. In determining the quantities of excavation to which unit prices shall apply, the limits of normal width and depth of excavation shall be as described below, unless other limits are indicated in the Contract Documents.

1. For pipes in trenches, less than or equal to a depth of 10.0-feet, the normal width of the trench

shall be measured between vertical planes which are a distance apart equal to the sum of 48 inches plus the nominal inside diameter of the pipe.

2. For pipes in trenches, between a depth greater than 10.0-feet and a depth of 20.0-feet, the normal width of the trench shall be measured between vertical planes which are a distance apart equal to the sum of 60-inches plus the nominal inside diameter of the pipe.

3. If the width so computed is less than 5.0-feet for trenches up to 10.0 feet deep than a width of 5.0 feet shall be the normal width. If the width so computed is less than 6.0-feet for trenches greater than 10.0-feet up to 20.0-feet than a width of 6.0-feet shall be the normal width.

4. The normal depth shall be measured to a distance of 0.5 feet below the bottom of the pipe in earth and 0.5 feet in rock, unless there be a cradle underneath the pipe, in which case the normal depth shall be measured to the underside of the cradle. The trench width for the cradle shall be assumed to be that specified above for pipes in the trench.

B. Quantities for payment shall be in accordance with the above limits or the actual widths, whichever is less.

C. For concrete placed directly against undisturbed earth, the normal width and depth of the excavation for such concrete shall be measured to the neat lines of the concrete as indicated on the Drawings or as ordered.

D. For concrete placed against rock surfaces resulting from rock excavation, the normal width and depth of the excavation shall be measured to 4 inches outside the neat lines of the concrete as indicated on the Drawings or as ordered.

E. For other structures, except manholes as noted below, the normal width shall be measured between vertical planes 1.0 feet outside the neat lines of the several parts of the structure, except that the width at any elevation shall be measured as not less than the width at a lower elevation. The normal depth shall be measured to the underside of that part of the structure for which the excavation is made.

F. No additional width or depth of trenches excavated in earth or rock shall be allowed at standard circular manholes. The pay limit for rock removed outside proposed manholes shall commence one foot (1.0) outside the widest dimension of the structure or shall be the maximum connecting trench width, whichever is greater.

G. Wherever bell holes are required for jointing pipe, they shall be provided without additional compensation over and above that resulting from measurements as above described.

1.03 BOLTS, ANCHOR BOLTS AND NUTS

A. Furnish bolts, anchor bolts, nuts, washers, plates and bolt sleeves required by equipment to be installed under this Contract in accordance herewith. Anchor bolts shall have suitable washers and, where so required, their nuts shall be hexagonal.

B. Anchor bolts, nuts, washers, plates, and bolt sleeves shall be galvanized unless otherwise indicated or specified.

C. Expansion bolts shall have malleable iron and lead composition elements of the required number of units and size.

D. Unless otherwise specified, stud, tap, and machine bolts, and nuts shall conform to the requirements of ASTM Standard Specification for Carbon Steel Externally and Internally Threaded Standard Fasteners, Designation A307. Hexagonal nuts of the same quality of metal as the bolts shall be used. All threads shall be clean cut and shall conform to ANSI Standard B1.1-1974 for Unified Inch Screw Threads (UN and UNR Thread Form).

E. Bolts, anchor bolts, nuts and washers, specified to be galvanized, shall be zinc coated, after being threaded, by the hot-dip process in conformity with the ASTM Standard Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strip, Designation A123, or the ASTM Standard Specifications for Zinc Coating (Hot Dip) on Iron and Steel Hardware, Designation A153, as is appropriate.

F. Bolts, anchor bolts, nuts, and washers specified to be stainless steel shall be Type 316 stainless steel unless otherwise indicated or specified.

G. Anchor bolts and expansion bolts shall be set accurately. If anchor bolts are set before the concrete has been placed, they shall be carefully held in

suitable templates of acceptable design. Where indicated on the Drawings, specified, or required, anchor bolts shall be provided with square plates at least 4 inches by 4 inches by 3/8 inches or shall have square heads and washers and be set in the concrete forms with suitable pipe sleeves, or both. If anchor or expansion bolts are set after the concrete has been placed, all necessary drilling and grouting or caulking shall be done by the Contractor and care shall be taken not to damage the structure or finish by cracking, chipping, spalling, or otherwise during the drilling and caulking.

1.04 CONCRETE INSERTS

A. Concrete inserts for hangers shall be designed to support safely, in the concrete that is used, the maximum load that can be imposed by the hangers used in the inserts. Inserts for hangers shall be of a type which will permit adjustment of the hangers both horizontally (in one plane) and vertically and locking of the hanger head or nut. All inserts shall be galvanized.

1.05 SLEEVES

A. Unless otherwise indicated on the Drawings or specified, openings for the passage of pipes through floors and walls shall be formed of sleeves of standard-weight, galvanized steel pipe. The sleeves shall be of ample diameter to pass the pipe and its insulation, if any, and to permit such expansion as may occur. Sleeves shall be of sufficient length to be flush at the walls and the bottom of slabs and to project 1 inch above the finished floor surface. Threaded nipples shall not be used as sleeves.

B. Sleeves in exterior walls below ground or in walls to have liquids on one or both sides shall have a 2 inch annular fin of 1/8 inch plate welded with a continuous weld completely around the sleeve at about mid-length. Sleeves shall be galvanized after the fins are attached.

C. All sleeves shall be set accurately before the concrete is placed or shall be built in accurately as the masonry is being built.

1.06 CUTTING AND PATCHING

A. The Contractor shall leave all chases or openings for the installation of his own or any other contractor's or subcontractor's work, or shall cut the same in existing work, and shall see that all sleeves or forms are at the Work and properly set in ample time to prevent delays. He shall see that all such chases, openings, and sleeves are located accurately and are of proper size and shape and shall consult

with the Engineer and the contractors and subcontractors concerned in reference to this work.

B. In case of his failure to leave or cut all such openings or have all such sleeves provided and set in proper time, he shall cut them or set them afterwards at his own expense, but in so doing he shall confine the cutting to the smallest extent possible consistent with the work to be done. In no case shall piers or structural members be cut without the written consent of the Engineer.

C. The Contractor shall carefully fit around, close up, repair, patch, and point around the work specified herein to the satisfaction of the Engineer.

D. All of this work shall be done by careful workmen competent to do such work and with the proper small hand tools. Power tools shall not be used except where, in the opinion of the Engineer, the type of tool proposed can be used without damage to any work or structures and without inconvenience or interference with the operation of any facilities. The Engineer's concurrence with the type of tools shall not in any way relieve or diminish the responsibility of the Contractor for such damage, inconvenience, or interference resulting from the use of such tools.

E. The Contractor shall not cut or alter the work of any subcontractors or any other contractor, nor permit any of his subcontractors to cut or alter the work of any other contractor, or subcontractor, except with the written consent of the contractor or subcontractor whose work is to be cut or altered or with the written consent of the Engineer. All cutting and patching or repairing made necessary by the negligence, carelessness, or incompetence of the Contractor or any of his subcontractors shall be done by or at the expense of the Contractor and shall be the full responsibility of the Contractor.

1.07 FOUNDATIONS, INSTALLATION AND GROUTING

A. Furnish materials and construct suitable concrete foundation for all equipment installed under this Contract, even though such foundations may not be indicated on the Drawings. The tops of foundations shall be at such elevations as will permit grouting as specified below.

B. Equipment shall be installed by skilled mechanics and in accordance with the instruction of the manufacturer.

C. In setting pumps, motors, and other items of equipment customarily grouted, make an allowance of at least 1-in. for grout under the equipment bases. Shims used to level and adjust the bases shall be steel. Shims may be left embedded in the grout, in which case they shall be installed neatly and so as to be as inconspicuous as possible in the completed work. Unless otherwise permitted, all grout shall be a suitable nonshrink grout.

D. Grout shall be mixed and placed in accordance with the recommendations of the manufacturer. Where practicable, the grout shall be placed through the grout holes in the base and worked outward and under the edges of the base and across the rough top of the concrete foundation to a peripheral form so constructed as to provide a suitable chamber around the top edge of the finished foundation.

E. Where such procedure is impracticable, the method of placing grout shall be as permitted by the Engineer. After the grout has hardened sufficiently, all forms, hoppers, and excess grout shall be removed, and all exposed grout surfaces shall be patched in an approved manner, if necessary, given a burlap-rubbed finish, and painted with at least two coats of an acceptable paint.

1.08 SERVICES OF MANUFACTURER'S REPRESENTATIVE

A. Arrange for the services of qualified factory service representatives from the companies manufacturing or supplying equipment and/or materials to be used or installed in the work as specified, to perform the following duties.

B. After installation of the listed equipment has been completed and the equipment is presumably ready for operation, but before others operate it, the representative shall inspect, operate, test, and adjust the equipment. The inspection shall include but shall not be limited to, the following points as applicable:

1. Soundness (without cracked or otherwise damaged parts).

2. Completeness in all details, as specified.

3. Correctness of setting, alignment, and relative arrangement of various parts.

4. Adequacy and correctness of packing, sealing and lubricants.

C. The operation, testing, and adjustment shall be as required to prove that the equipment is left in proper condition for satisfactory operation under the conditions specified.

D. On completion of his work, the manufacturer's or supplier's representative shall submit in triplicate to the Engineer a complete signed report of the result of his inspection, operation, adjustments, and tests. The report shall include detailed descriptions of the points inspected, tests and adjustments made, quantitative results obtained if such are specified, and suggestions for precautions to be taken to ensure proper maintenance. The report also shall include a certificate that specifically states "the equipment conforms to the requirements of the Contract and is ready for permanent operation and that nothing in the installation will render the manufacturer's warranty null and void".

E. After the Engineer has reviewed the reports from the manufacturer's representatives, the Contractor shall make all arrangements to have the manufacturer's representatives present when the field acceptance tests are made by the Engineer without additional cost to the Owner.

1.09 OPERATING INSTRUCTIONS AND PARTS LISTS

A. Where reference is made in the Technical Specifications to operating instructions and spare parts lists, furnish, for each piece of equipment, six complete sets giving the information listed below:

1. Clear and concise instructions for the operation, adjustment, and lubrication and other maintenance of the equipment. These instructions shall include a complete lubrication chart.

2. List of all parts for the equipment, with catalog numbers and other data necessary for ordering replacement parts.

B. Such instructions and parts lists shall be annotated to indicate only the specific equipment furnished. References to other sizes and types or models of similar equipment shall be deleted or neatly lined out.

C. Such operating instructions and parts lists shall be delivered to the Engineer at the same time that the equipment to which they pertain is delivered to the site.

1.10 LUBRICANTS

A. During testing and prior to acceptance, Furnish all lubricants necessary for the proper lubrication of all equipment furnished under this Contract.

1.11 SPECIAL TOOLS

A. For each type of equipment furnished provide a complete set of all special tools (including grease guns or other lubricating devices) which may be necessary for the adjustment, operation, maintenance, and disassembly of such equipment. Tools shall be high-grade, smooth, forged, alloy, tool steel. Grease guns shall be lever type.

B. Special tools are considered to be those tools which because of their limited use are not normally available, but which are necessary for the particular equipment.

C. Special tools shall be delivered at the same time as the equipment to which they pertain. Properly store and safeguard such special tools until completion of the work, at which time they shall be formally transmitted and delivered to the Owner.

1.12 EQUIPMENT DRIVE GUARDS

A. All equipment driven by open shafts, belts, chains, or gears shall be provided with acceptable all-metal guards enclosing the drive mechanism. Guards shall be constructed of galvanized sheet steel or galvanized woven wire or expanded metal set in a frame of galvanized steel members. Guards shall be secured in position by steel braces or straps that will permit easy removal for servicing the equipment. The guards shall conform in all respects to all applicable safety codes and regulations.

1.13 PROTECTION AGAINST ELECTROLYSIS

A. Where dissimilar metals are used in conjunction with each other, suitable insulation shall be provided between adjoining surfaces so as to eliminate direct contact and any resultant electrolysis. The insulation shall be bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or by other acceptable materials.

1.14 COVERING EXCAVATED TRENCH

A. In addition to the requirements in Section 00 72 00 titled Interference with and Protection of Streets. Cover all open excavations when construction operations are suspended at the end of the day, or in excavated trenches where work is not actually in progress. Cover shall be capable of withstanding AASHTO H20-S16 loading. This cover shall consist of steel plates or some other satisfactory cover of adequate size and strength suitably held in place to keep all traffic out of excavations, all as verified in

writing by the Contractor. The cover shall be laid over the excavation until it is backfilled.

1.15 MAINTAINING TRENCH EXCAVATIONS

A. The length of trench opened at any time, from point where ground is being broken to completed backfill, and also the amount of space in streets or public and private lands occupied by equipment, trench, and supplies, shall not exceed the length of space considered reasonably necessary and expedient by the Engineer. In determining the length of open trench or spaces for equipment, materials, supplies and other necessities, the Engineer will consider: the nature of the lands or streets where work is being done; types and methods of construction and equipment being used; inconvenience to the public or to private parties; possible dangers; and other proper matters. All work must be constructed with a minimum inconvenience and danger to the public and all other parties concerned.

B. Whenever any trench obstructs pedestrian and vehicular traffic in or to any public street, private driveway or property entrance, or on private property, take such means as may be necessary to maintain pedestrian and vehicular traffic and access. Until such time as the work may have attained sufficient strength to support backfill, or if for any other reason it is not expedient to backfill the trench immediately, construct and maintain suitable plank crossing and bridges to carry essential traffic in or to the street, driveway or property in question, as specified or directed.

C. Suitable signs, lights, and such items required by Police Authorities to direct traffic, shall be furnished and maintained by the Contractor at his own expense.

D. Keep streets and premises free from unnecessary obstructions, debris and all other materials. The Engineer may, at any time, order all equipment, materials, surplus from excavations, debris and all other materials lying outside that length of working space, promptly removed. Should the Contractor fail to remove such material within 24 hours after notice to remove the same, the Owner may cause any part or all of such materials to be removed by such persons as he may employ, at the Contractor's expense; and may deduct the costs thereof from payments which may be or may become, due to the Contractor under the Contract. In special cases, where public safety urgently demands it, the Owner may cause such materials to be removed at the Contractor's expense without prior notice.

1.16 DISRUPTION OF STORM DRAINS

A. Portions of the Work may be located in areas that are serviced by storm drains. Take extreme precaution to minimize disruption of the drains, and repair and/or make restitution for repairs by others for all disruptions caused by the construction operations.

1.17 PRECAUTION AGAINST HYDRAULIC UPLIFT DURING CONSTRUCTION

A. Protect all structures against hydraulic uplift until such structures have beneficially completed.

1.18 BLASTING AND PRE-CONSTRUCTION BLASTING SURVEY

A. Blasting will not be permitted.

B. In rock excavation it is especially required that the blasting shall be conducted with all possible care in order to avoid injury to persons and property. The rock shall be well-covered and a sufficient warning shall be given to all persons in the vicinity of the work before blasting occurs.

C. The explosives used shall be of such power and placed in such quantities and positions that will not make the excavation unduly large nor shatter unnecessarily upon or against where the work is to be installed nor injure the work already in place. Where masonry is to be built against the rock, all loose or shattered rock shall be completely removed so the masonry can be built firmly in contact with the solid rock.

D. Explosives must be carefully transported, stored, handled and used as required by the local and State laws, and the necessary permits for such transportation, storage, handling, and use shall be obtained by the Contractor who shall show such permits to the Owner and Engineer before any blasting is allowed. Keep on the job only such quantity of explosives as may be needed for the work underway and only during such time as they are being used. Explosives shall be stored in a secure manner and separately from all tools. Caps or detonators shall be stored separately and at a distance at least 100 feet from the explosives. Receptacles especially designed for use in the storage of explosives shall be used, and they shall be proofed against bullet, fire, or other conditions which might cause explosion of the contents. When the need for explosives is ended, all such material remaining on the job shall be promptly removed from the premises.

E. Under any circumstances, the approval of the Owner and Engineer shall be first obtained before blasting is permitted. Where, in the opinion of the Owner, and/or Engineer, blasting is unsafe or dangerous to persons or existing structures and utilities, employ pneumatic tools, drilling and splitting mechanically or by hand or other means not requiring the use of explosives for the removal of rock, boulders or ledge; at no added expense to the Owner.

F. Before any explosives, such dynamite or detonator caps are stored or used at the site of work under this Contract, notify the Police and Fire Departments or other agencies having jurisdiction for instructions relative to the regulations for possession and use of explosives in the project area. Obtain and maintain all required permits or licenses for possession and use of explosives on the site of construction. In addition, the Contractor shall be responsible for:

1. A person who shall be responsible for the explosive materials at all times.
2. The keeping of records which shall show the date and time, the explosive materials and quantities used for construction, and the materials removed from the site after blasting is completed.
3. The non-storage of explosive materials overnight on the site of construction under this Contract.
4. The immediate reporting to the Police and Fire Departments or other agencies having jurisdiction of all unaccounted for explosive material.

G. All records relating to the possession and use of explosive materials under this contract shall be open to inspection by the Police Department, Fire Department, the Owner and Engineer, or other agencies having jurisdiction at any time.

H. The use of explosives on privately owned properties shall be subject to additional requirements of the above-mentioned property owner.

I. Cover all blasts with suitable blasting mats in such a manner as to prevent damage to landscape features, structures, facilities, or other surrounding objects, and in a manner that will prevent injury to persons.

J. The use of the maximum number of drill holes, together with the minimum number of explosives in each drill hole and using split-second delayed caps,

is the preferred method of accomplishing the blasting operations in conjunction with the rock excavation.

K. Keep all blasting logs of all his blasting operations. The blasting logs shall include all pertinent information with respect to personnel, times, locations, description of charges, methods, details of blasting patterns, excavations and such other information as may be required. Furnish to the Engineer each day that blasting operations are performed, certified copies of the Contractor's blasting logs covering all of his blasting operations.

L. Prior to and during construction, the Contractor shall employ, at his own expense, the services of an approved, fully competent and qualified vibration consultant(s) and any other experts or Insurance Representatives deemed necessary by the Engineer and the Contractor's Insurance, to conduct comprehensive and detailed pre-construction and blast monitoring surveys of all properties (private and public alike) which in the opinion of the Engineer and/or the applicable insurance companies may be affected, whether directly or indirectly by any construction activities required under this Contract, including but not limited to blasting. Such areas of concern shall include but not be limited to existing utilities, private wells for potable water, properties, buildings, structures (surface and/or subsurface) and all other applicable areas throughout the Contract area. The Contractor must submit to the Engineer, for approval, prior to employment thereof, the name, professional experience and any other qualifications deemed necessary, of the proposed vibration consultant(s) in triplicate to the Engineer for review and approval at least seven (7) calendar days prior to any construction and the resulting pre-construction report as specified above including but not limited to any and all photographs, notes, appraisals, findings, precautions and recommendations.

M. All blasting programs required under this Contract shall be subject to review by the Engineer prior to the commencement of blasting or at any time thereafter and shall be designed and controlled, with a reasonable margin of safety such that any blast vibrations or resulting debris does not cause damage of any nature to the surrounding areas. All blasting operations shall be in conformity with the reviewed program. Blast monitoring surveys conducted during construction shall be subject to review by the Engineer within seven (7) days after completion thereof.

1.19 NAMEPLATES

A. With the exceptions mentioned below, each piece of equipment shall be provided with a substantial nameplate of noncorrodible metal, securely fastened in place and clearly and permanently inscribed with the manufacturer's name, model or type designation, serial number, principal rated capacities, electrical or other power characteristics, and similar information as appropriate. Coordinate nameplate text requirements with Engineer prior to fabrication. Nameplates shall be securely mounted in a readily visible location approved by the Engineer. Equipment Specification sections may contain additional information regarding nameplates.

B. This requirement shall not apply to standard manually operated hydrants or to gate, globe, check, and plug valves.

C. Each process valve shall be provided with a substantial tag of noncorrodible metal securely fastened in place and inscribed with an identification number in conformance with the Valve Identification Schedule indicated on the drawings or furnished later by the Engineer.

1.20 SPECIAL SAFETY PRECAUTIONS

A. Work includes the removal and demolition of the existing chlorine disinfection system. Chlorine is an extremely active chemical, which is extremely toxic and corrosive. Chlorine must be stored and handled very carefully to avoid possible serious injuries or death to workers and the public.

B. The existing chlorine disinfection system consists of 1 ton chlorine cylinders, which store liquid chlorine under pressure, chlorination equipment, and piping. (Under atmospheric pressure, chlorine exists in the gaseous form). The system draws liquid chlorine from the cylinders evaporates the chlorine to gaseous form and then injects the gas into a plant water line to form a chlorine solution. This solution is then transported to various points of application.

C. Contractor shall take all necessary safety precautions in completing the work including coordinating with and complying with emergency procedures and requirements of the Owner, Police Department, Fire Department, and the Rhode Island Department of Environmental Management. The Contractor shall comply with all applicable federal, state and local laws, ordinances, rules and regulations and lawful orders of all authorities

having jurisdiction for the safety of persons and protection of property. The Contractor shall have all necessary safety apparatus on-site and workers shall be instructed in its use.

1.21 LAND, EASEMENTS, AND RIGHTS-OF-WAY

A. As indicated, a portion of the work may be located within easements and/or rights-of-way, obtained or which will be obtained by the Owner, through private property. On all other lands, the Contractor has no rights unless he obtains them from the proper parties as specified in Section 00 72 00, Occupying Private Land.

B. Prior to issuance of the Notice to Proceed, the Owner shall obtain all land, easements and rights-of-way necessary for carrying out and for the completion of the work to be performed pursuant to the Contract Documents, unless otherwise mutually agreed.

C. The Owner shall provide to the Contractor information which delineates and describes the lands owned and rights-of-way acquired.

D. The Contractor shall provide at his own expense and without liability to the Owner any additional land and access thereto that the Contractor may desire for temporary construction facilities or for storage of equipment and materials.

E. If however, lands, easements or rights-of-way cannot be obtained before work on the project begins, the Contractor shall begin his work upon such land, easements or rights-of-way as have been previously acquired by the Owner, and no claims for damages whatsoever will be allowed by reason of its inability to procure the lands, easements, or rights-of-way for the said work, the Contractor shall not be entitled to make or assert a claim for damages by reason of the said delay, or to withdraw from the Contract except by consent of the Owner. Time for completion of work will be extended to such time as the Owner determines will compensate for the time lost by such delay, such determination to set forth in writing.

1.22 CLEANING FINISHED WORK

A. After the work is completed, the pipes, manholes and structures shall be carefully cleaned free of debris and dirt, broken masonry, and mortar, and left in first class condition, ready to use. All temporary or excess materials shall be disposed of

off-site and the work left broom clean, to the satisfaction of the Engineer.

END OF SECTION

TECHNICAL SPECIFICATIONS ISSUED FOR BID

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SECTION 01 01 90
COORDINATION AND MEETINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Requirements for coordinating the various parts of Work under this Contract. Specific items are listed below for the Contractor's convenience and as a general listing but shall not be considered to be all inclusive. The Contractor shall coordinate all inter-related aspects of the Work as required to complete the Project.
- B. Administrative and Procedural requirements for Project Meetings.

1.2 COORDINATION

- A. School Schedule
 - 1. Coordinate work with school schedule to limit construction impact on the school.

1.3 REQUIREMENTS

- A. The Contractor shall:
 - 1. Coordinate the Work, scheduling, submittals, and specific requirements of the various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements.
 - 2. Coordinate completion and clean-up of Work in different trades in preparation for sequential arrival at Substantial Completion.
- B. The Owner may require full or partial occupancy of premises. Coordinate access to site for correction of defective Work and Work not in accordance with the Contract Documents, to minimize disruption of Owner's activities. Continue to secure the site from public access.
- C. Coordinate work with all utility companies necessary for completion of work under this contract.

1.4 MEETINGS

- A. The Engineer will schedule and administer a Pre-construction Conference. The conference will be scheduled within fourteen days after issuance of the Notice to Proceed. The Contractor shall be prepared to address topics such as projected construction schedules, critical work areas, construction phasing, site facilities, shop drawings and product submittals.
- B. The Engineer will schedule and administer Progress Meetings and specially called meetings throughout the duration of the Work, at a minimum of one per-month. Actual meeting frequency will vary based on overall need, production of the Work, types of work underway, and overall project progress.

- C. The time and the location of the meetings will be designated by the Engineer. The Contractor will prepare a meeting agenda with copies for participants, will preside at meetings, record minutes, and distribute copies of the minutes to the participants.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION

SECTION 01 11 00
SUMMARY OF WORK

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Work covered by the Contract, listing of Owner, Project location, Engineer. Sequence requirements, the Contractor's use of the premises, and the Owner's occupancy requirements.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work includes but is not necessarily limited to the following:
- B. The project purpose is to construct a public playground.
- C. Site work includes clearing and grubbing, saw cutting asphalt, debris removal, as well as grading, shaping excavating, filling, setting curbing, forming, pouring, and placing concrete, installing conventional HMA pavements.
- D. Work includes loaming, seeding, planting of perennials, shrubs, and trees, as well as the installation of various types of site amenities, fencing, play equipment, and play area surfacing.

1.3 OWNER

The Town of Hopkinton
Susan Rothermich, CPA, MCPPO
Assistant Superintendent of Finance & Operations
Hopkinton Public Schools
89 Hayden Rowe Street
Hopkinton, MA 01748
(508) 417-9385
srothermich@hopkinton.k12.ma.us

1.4 PROJECT LOCATION

129 HAYDEN ROWE ST,
HOPKINTON, MA 01748

1.5 ENGINEER

BETA Group Inc.
701 George Washington Highway
Lincoln Rhode Island 02865
401.333.2382
Project Manager Nathan Socha, PLA, ASLA

1.6 WORK SEQUENCE

- A. In order that Work may be conducted with minimum inconvenience to the public and, work under this Contract may be coordinated with other work which may be under construction or contemplated, and that Work under the Contract may conform to conditions which it has been undertaken or conditions attached to a right-of-way or particular location for this Work, the Engineer may determine the point or points and time or times when portions of Work will commence or be carried on and may issue orders pertaining to the work sequence, relative to the rate of progress on several portions of the work.

1.7 OWNER FURNISHED PRODUCTS

- A. Owner's Responsibilities:
 - 1. Arrange for and deliver Owner-reviewed Shop Drawings, Product Data, and Samples to Contractor.
 - 2. Arrange and pay for delivery to Site.
 - 3. Direct payment for Police Details required to conduct the Work.
 - 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 - 5. Arrange for manufacturers' warranties, inspections, and service.
- B. Contractor's Responsibilities:
 - 1. Coordination of the Work
 - 2. Review Owner-reviewed Shop Drawings, Product Data, and Samples.
 - 3. Receive and unload products at Site; inspect for completeness or damage.
 - 4. Plan for, coordinate, and maintain traffic protection /police details at the site entrance.
 - 5. Execution of the Work shown on the plans and in the specifications.
 - 6. Repair or replace items damaged after receipt or install prior to Final Acceptance.
 - 7. Handle, store, install, and finish products.
- C. Items furnished by Owner for installation by Contractor:
 - 1. Playground Equipment
 - 2. Site Furnishings
 - 3. Shade Structure

1.8 CONTRACTOR USE OF PROJECT SITE / PREMISES

- A. The Contractor's use of premises shall be within the limits shown on the Drawings and as defined in the OWNER CONTRACT AGREEMENT, for the performance of the Work.
- B. Limit use of Project Site to areas within the Contract limits indicated. Do not disturb portions of the Project Site beyond the areas in which the Work is indicated.
- C. The Contractor shall maintain access and utilities to the existing site and facilities at all times.

- D. The Contractor shall assume full responsibility for security of all materials and equipment on the site, including those of his subcontractor's.
- E. If directed by the Owner, the Contractor shall move any stored items that interfere with the operations of the Owner.
- F. Obtain and pay for use of additional storage or work areas outside the Project Site if needed to perform the Work.

1.9 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction (AHJ).
- B. On-Site Work Hours: Limit Work to between 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved in writing by Owner. Contractor shall schedule work to minimize impact to school.
- C. Noise, Vibration, Dust, and Odors: Coordinate with Owner in regard to work operations and that may result in high levels of noise and vibration, dust, odors, or other disruption.
 - 1. Notify Engineer and Owner not less than [two] days in advance of proposed disruptive operations.
 - 2. Obtain Owner's written permission before proceeding with disruptive operations.
- D. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, marijuana, and other controlled substances on Project Site, is not permitted.
- E. Employee Identification: If so, requested by the Owner, the Contractor shall provide CORI forms for Contractor personnel working on Project Site.
 - 1. Maintain list of approved screened personnel.

PART 2 - MATERIALS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary
 - 1. Conditions and other Division 01 GENERAL REQUIREMENTS Specification Sections, apply to this Section.
 - 2. The Contractor shall carefully examine all the Contract Documents for requirements that affect the work of this Section. The exact scope of this Section cannot be determined without a thorough review of all specification sections and other Contract Documents.
- B. SUMMARY
 - 1. The Schedule of Alternates included in this Section lists all the Alternates that appear in the Contract Documents.
 - 2. For each of the Alternates scheduled at the end of this Section, bidders shall state the amount in the proposal to be added to or deducted from the Contract Sum for the work.
 - 3. Consult the Specifications and the Drawings for detailed requirements of each Alternate.
- C. GENERAL INSTRUCTIONS
 - 1. Each Bidder shall be held responsible for examining the scope of the Alternates defined herein and for recognizing any modifications to his work caused by any Alternate.
 - 2. The Bid Alternate Price shall be complete cost, including overhead, profit, bonds, insurance, transportation, and all other costs connected with, or incidental to, the work described.
 - 3. Alternates listed below in the Schedule of Alternates are listed in order. The Contract will be awarded based on the Base Bid only, or the Base Bid plus any number of Alternates strictly added in order.
 - 4. All dimensional and quantity estimates provided in the descriptions of the work below (noted with "approx.") are provided for initial reference only; exact dimensions and quantities for the full extent of the work as described in the Drawings and Specifications shall be confirmed by the Contractor before submitting the price. The Contractor shall be responsible for the full extent of the work described, not to be limited by the approximate quantities.
- D. ALTERNATES
 - 1. Definition: "Alternates" are alternate products, materials, equipment, systems, methods, units of work, or major elements of the construction, which may, at the

authority's option and under the terms established by the contract or agreement, be selected for the work in lieu of the corresponding requirements of the contract documents or in addition to the work of the base bid as noted.

2. Alternate Requirements: A Schedule of Alternates is included at the end of this Section. Each Alternate is defined using abbreviated language, recognizing that the Contract Documents define the requirements. coordinate related work to ensure that work affected by each alternate is complete and properly interfaced with work of each selected alternate.
3. Provide written proposals for each Alternate on the Bid Form for the Authority's consideration. Each proposal amount shall include the entire cost of the Alternate portion of the work, including overhead, profit, and other costs including cost of interfacing and coordinating the alternate with related and adjacent work.

1.2 SCHEDULE OF ALTERNATES

A. ADDITIVE ALTERNATE NO. 1 – Site Furnishings and Shade Structure

1. Additive Alternate No. 1 on the Bid Form shall be on a Lump Sum basis for required for furnishing all labor, materials, equipment, and incidentals required for installing picnic table and Shade Structure including providing foundations as required per the manufacturer, shown on the drawings, and as specified herein, complete and accepted in place, to the full satisfaction of the Engineer. Town to purchase the Shade Structure directly from the manufacturer.

B. ADDITIVE ALTERNATE NO. 2 - Rube Goldberg Panel

1. Additive Alternate No. 2 on the Bid Form shall be on a Lump Sum basis for required for furnishing all labor, materials, equipment, and incidentals required for installing Rube Goldberg Panel including providing foundations as required per the manufacturer, shown on the drawings, and as specified herein, complete and accepted in place, to the full satisfaction of the Engineer. Town to purchase the Rube Goldberg Panel directly from the manufacturer.

C. ADDITIVE ALTERNATE NO.3 - Play House

1. Additive Alternate No. 3 on the Bid Form shall be on a Lump Sum basis for required for furnishing all labor, materials, equipment, and incidentals required for installing Playhouse including providing foundations as required per the manufacturer, shown on the drawings, and as specified herein, complete and accepted in place, to the full satisfaction of the Engineer. Town to purchase the Playhouse directly from the manufacturer.

END OF SECTION

SECTION 01 29 73
SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Requirements for breakdown of Lump Sum bid.
- B. Related Sections
 - 1. Section 01 33 00, SUBMITTAL PROCEDURES

1.2 BREAKDOWN OF LUMP SUM BID

- A. Within 20 business days of the date of the executed Contract, a list detailing the breakdown of the Lump Sum bid by the appropriate Divisions of these Specifications or as otherwise directed by the Engineer, shall be submitted for review and concurrence by the Engineer. This list will be used by the Engineer as a guide in preparing estimates for payment. The list shall be an accurate representation of costs required to complete the Work in accordance with the Contract Documents.
- B. A schedule of the monthly value of work done based on the Progress Schedule submitted under Section 01 33 00 - SUBMITTAL PROCEDURES shall be submitted within 20 business days of the date of the executed Contract. The schedule shall show the total sum of work done for each month of the projected construction period and shall be updated monthly to reflect the actual amount requisitioned for payment.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01 33 00

SUBMITTALS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. The General Documents, as listed on the Table of Contents, and applicable parts of Division 01, GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Contract Documents and all other Sections of the Specifications for requirements therein affecting the work of this Section.

1.2 DESCRIPTION OF WORK

- A. Requirements for submission of submittal procedures, construction schedule, shop drawings, product data, samples, manufacturer's instructions and certificates, construction photographs, and record drawings.

1.3 RELATED WORK UNDER OTHER SECTIONS

- A. The following items of related work are specified and included in other Sections of the Specifications:
 - 1. Division 1, Section 01 40 00, QUALITY CONTROL
 - 2. Division 1, Section 01 77 00, CONTRACT CLOSEOUT

1.4 REVIEW TIME:

- A. The Engineer will review and respond to properly prepared submittals within 14 business days after receipt, unless otherwise indicated. This period does not include time for resubmittals.

PART 2 - SUBMITTALS - NOT USED

2.1 PROGRESS SCHEDULE

- A. Refer to Section 01 32 00, CONSTRUCTION PROGRESS SCHEDULE for Critical Path Method (CPM) construction scheduling requirements.
- B. Within fourteen (14) calendar days after execution of the Contract Documents, the Contractor shall submit to the Engineer for review a construction progress schedule conforming to requirements specified. This schedule should show the proposed dates of commencement and completion of each of the various subdivisions of work required under this Contract and the anticipated monthly percentage of completion based on the total contract price. The Contractor shall be responsible for updating and/or revising this schedule whenever directed by the Engineer throughout the duration of the Contract.
- C. Special attention is directed to the requirement that the Contractor shall start the Work, as specified under this Contract, no later than thirty (30) calendar days after the execution of the

Contract Documents, unless otherwise directed by the Owner. The Contractor shall comply with all pre-construction requirements as specified. The Owner reserves the right to delay the commencement of the Work or any part thereof if the specified requirements as determined by the Engineer have not been satisfied. The Owner further reserves the right to limit or, delay construction, or certain activities thereof, in certain areas of the Contract should the Owner deem it to be in the public's best interest and/or safety to do so.

- D. The Contractor shall contact the Owner concerning any public or semi-public events that may occur during the construction period that may affect construction. The Contractor alone shall be responsible for arranging his construction sequence to conform to any restrictions these events may impose. No claims for extras will be allowed because of any delay, extra materials handling, extra excavation, etc. caused by the imposed restrictions. However, additional time may be granted for completion of the work to compensate for delays caused by said restrictions.

2.2 SHOP DRAWINGS

- A. Submit all shop and working drawings required for the Contract, and materials and equipment for which such drawings are specifically requested.
- B. A maximum of two (2) submittals of each shop drawing will be reviewed by the Engineer. If more submittals are required due to the Contractor's neglect or failure to fulfill the requirements of the Contract plans and specifications, or to make corrections or modifications required by the Engineer in the review of the first two submittals, the Engineer will review the submittal and the Contractor will be responsible for the cost of the review, as determined by the Owner based on the Engineer's documentation of time and rates for additional services established in the Engineering Agreement between the Owner and the Engineer.
- C. Such drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. When the dimensions are of particular importance, or when specified, the drawings shall be certified by the manufacturer or fabricator as correct for the Contract.
- D. When so specified or if considered by the Engineer to be acceptable, manufacturer's specifications, catalog data, descriptive matter, illustrations, etc., may be submitted in place of shop and working drawings.
- E. The Contractor shall be responsible for the prompt and timely submittal of all shop and working drawings to eliminate delay to the Work due to the absence of such drawings. All shop and working drawings must be submitted to the Engineer within thirty (30) calendar days prior to incorporation into the Work, unless otherwise permitted by the Engineer. Prior to the submittal of any shop drawings, the Contractor shall submit a schedule of proposed shop drawing transmittals. The schedule shall identify the subject matter of each transmittal, the corresponding specification section number and the proposed date of submission. Prior to and during the progress of the Work the schedule shall be revised and resubmitted as requested by the Engineer.
- F. No material or equipment shall be purchased or fabricated for the Contract until the required shop and working drawings have been submitted as hereinabove provided and reviewed for conformance to the Contract requirements. All such materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by said drawings.

- G. Until the necessary review has been made, the Contractor shall not proceed with any portion of the Work (such as the construction of foundations) for which review is required.
- H. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from his subcontractors and returning reviewed drawings to them. All shop and working drawings shall be prepared on standard size, 24 inch by 36 inch sheets, except those which are made by changing existing standard shop and working drawings. All drawings shall be clearly marked with the names of the Owner, Contractor, and building, equipment, or structure to which the drawing applies, and shall be suitable numbered. Submitted shop drawings shall be accompanied by a letter of transmittal, completed by the Contractor as provided by the Engineer.
- I. Only drawings which have been checked and corrected by the fabricator should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Drawings and Specifications in all respects. All drawings which are correct shall be marked with the date, checker's name, and indication of the Contractor's approval, and then shall be submitted to the Engineer; other drawings shall be returned for correction.
- J. If a shop drawing shows any deviation from the Contract requirements, the Contractor shall make specific mention of the deviations in his letter of transmittal.
- K. The review of shop and working drawings by the Engineer will be general only, and nothing contained in this Section shall relieve, diminish or alter in any respect the responsibilities of the Contractor under the Contract Documents and in particular, the specific responsibility of the Contractor for details of design and dimensions necessary for proper fitting and construction of the work as required by the Contract and for achieving the result and performance as specified. The Contractor shall be responsible for errors and omissions in shop drawings.
- L. Should the Contractor submit equipment that requires modifications to the structures, piping, electrical conduit, wires, appurtenances, or layouts etc., either existing or as detailed on the Drawings, he shall also submit details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the Owner, shall do the work necessary to make such modifications.
- M. The Contractor shall furnish additional copies of shop drawings or catalog cuts when so requested.

2.3 SCHEDULING OF WORK

- A. Before starting work or within ten (10) calendar days of Notice to Proceed, whichever comes first, the Contractor shall submit the following:
 - 1. A construction schedule which shall include dates and time period descriptions for the items listed below. The schedule shall indicate lead time impact of material availability on the overall construction timetable.
 - a. Start of construction date
 - b. Beginning and end dates for each major phase of work
 - c. Schedule for submittal of all required Shop Drawings and Samples
 - d. Substantial Completion date
 - e. Final Completion date

2. Site organization plans and work schedule shall be subject to Owner's Representative's approval and shall be updated as necessary during the course of construction.

2.4 WORK PROGRESS REPORT

- A. Contractor shall prepare reports of his operations and forward them to the Owner's Representative. The reports shall contain at least the following information.
 1. Weather conditions.
 2. Manpower on the job in each trade.
 3. Major items of equipment on the job.
 4. A brief summary of work accomplished that week.
 5. Materials and equipment items arriving or leaving site.
 6. Significant events.
 7. Any tests made and their result if known.
 8. Any oral instructions received.
 9. Visitors to the job.
- B. Contractor shall maintain a file of copies of the reports on the site and make it available to the Owner upon request.

2.5 SCHEDULE OF VALUES

- A. Prior to the first request for payment, the General Contractor shall submit to the Owner's Representative a Schedule of Values of the various portions of the work including quantities when requested, aggregating the total contract sum, and divided so as to facilitate payments for work under each Section. The schedule shall be prepared in such form as specified or as the Owner's Representative may approve. The list shall be an accurate representation of costs required to complete the Work in accordance with the Contract Documents. This schedule requires the approval of the Owner's Representative and shall be used only as a basis for the Contractor's requests for payment.

2.6 PRODUCT DESCRIPTION, ACCEPTABILITY AND SUBSTITUTIONS

- A. Products are specified by ASTM or other reference standards, and/or by manufacturer's name and model number, or by trade name. When specified only by reference standard(s), the Contractor may select products meeting this standard by any manufacturer. When several products or manufacturers are specified as being equally acceptable, the Contractor has the option of using any product or manufacturer listed. When one product or manufacturer is specified, and an "or equal" clause allows substitution, the Contractor must demonstrate through full testing, and certifications, etc., that the equivalent product being submitted is equal to or exceeds all technical, performance, and visual criteria of the original, specified item. When only one product or manufacturer is specified, and no "or equal" clause allows substitution, the Contractor must use that product or manufacturer. The Owner has the final indisputable word on accepting substitutions.

- B. After the Contract has been executed, the Owner's Representative will consider a formal, written request for the substitution of products in place of those specified under the following conditions:
1. The request is accompanied by complete technical data and product installation instructions on the proposed substitution, substantiating compliance with the Contract Documents, including product identification, performance and test data, references, and samples where applicable, and an itemized comparison of the proposed substitution with the product specified, with data relating to Contract time schedule, design and visual appearance where applicable.
 2. The request is accompanied by detailed cost data on the proposed substitution in comparison with the product specified, whether or not the modification of the Contract Sum is to be a consideration.
 3. It is understood by the Contractor that the request for substitution:
 - a. Represents that the Contractor has personally investigated the proposed product and has determined that it is equal to or superior in all respects to the product specified.
 - b. Represents that the Contractor will provide the same guarantee for the substitution that he would for the product specified, whether the manufacturer's standard guarantee is the same period or not.
 - c. Represents that the Contractor certifies that the cost data presented is complete and includes all related costs under this Contract, and that the Contractor waives all claims for additional costs related to the substitution which subsequently become apparent.
 - d. Represents that the Contractor will coordinate the installation of the accepted substitute, making such changes as may be required for the work to be completed in all respects, at no additional cost to the Owner.
 - e. Represents that the Contractor waives all claims for extensions of time related to the substitution, including allowance for evaluation of the proposed substitution by the Owner's Representative.
- C. Requests for substitutions will not be considered if:
1. They are indicated or implied on shop drawing submissions without prior formal, written request as required above, and their implementation requires revision of the Contract Documents in order to accommodate their use.

2.7 SHOP DRAWINGS, SUBMITTALS, AND SAMPLES

- A. The Contractor shall provide the following submittals designated below, subject to additional requirements of individual Technical Sections of the Specifications:
1. Submittals shall be made electronically, including manufacturer's literature and shop drawings. Submittals must include the requirements below, including verification that the General Contractor has reviewed and approved submittals from any subcontractors (if applicable) and suppliers prior to submitting for approval.
 2. Returned submittals shall also be made electronically. Electronic file labeling shall be reviewed at the pre-construction meeting for consistency.
 3. On-site mock-ups: Minimum of one, or as required by technical specification sections.

- B. Submittals shall be delivered to the Owner's Representative via email to:
nsocha@beta-inc.com
- C. Covering letters of transmittal which accompany Shop Drawings or other submittals shall contain the following information:
 - 1. Contractor's name, address and telephone number.
 - 2. Supplier's name, address and telephone number.
 - 3. Project title and Specification Section reference
 - 4. Reference to any prior actions on related submittals.
- D. Shop Drawings and all other submittals shall have the Contractor's approval on each drawing signed and dated, as evidence of the Contractor's verification and coordination of items submitted. Items not so marked will be returned to the Contractor without comment. Catalog cuts and brochures shall have items proposed for the project installation readily identified for review by the Owner's Representative. Submittals not so marked will be returned by the Owner's Representative for resubmission by the Contractor.
- E. The initial submission for each specification item, trade, class, or category of work shall be a complete and integrated submission, including all required Shop Drawings, product data, samples, and all other information necessary to permit a thorough and detailed review. Partial or incomplete submissions will be returned for completion without review. If, in the opinion of the Owner's Representative, a submission cannot be completely evaluated without reference to the submission for a related item or work not yet submitted, the submission of the related item may be required prior to review of the primary submission.
- F. Reproductions of Contract Drawings are acceptable as Shop Drawings if specifically authorized in writing by the Owner's Representative.
- G. Normal return time for submissions after review shall be three (3) business days following Owner's Representative's receipt of submission and transmittal letter.
 - 1. Review of submittals involving substitutions or variations from the Contract Documents may exceed the normal review time.
 - 2. Disapproved submittals shall be resubmitted within fourteen consecutive calendar days after receipt by Contractor of transmittal letter.
 - 3. Disapproved submittals and final approval of Shop Drawings, materials, etc., will not be acceptable as a cause for delay under the contract completion time clause.
- H. If a shop drawing shows any deviation from the Contract requirements, the Contractor shall make specific mention of the deviations in the letter of transmittal.
- I. No material or equipment shall be purchased or fabricated for the Contract until the required shop and working drawings have been submitted as hereinabove provided and reviewed for conformance to the Contract requirements. All such materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by said drawings.
- J. Until the necessary review has been made, the Contractor shall not proceed with any portion of the Work for which the review is required.

- K. Approval of Shop Drawings shall not relieve the Contractor from responsibility for any errors or omissions in such drawings nor from responsibility for complying with the requirements of this contract.

PART 3 - PRODUCTS - NOT USED

PART 4 - EXECUTION - NOT USED

END OF SECTION

SECTION 01 41 00
TESTING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Qualification, duties, and responsibilities of testing laboratories.
 - 2. Coordination and scheduling responsibilities of the Contractor.
- B. Related Sections
 - 1. Section 01 60 00, MATERIALS & EQUIPMENT

1.2 PAYMENT PROCEDURES

- A. Initial Testing
 - 1. The Owner will pay for initial testing services required by the Engineer, unless noted otherwise.
- B. Retesting
 - 1. When initial tests indicate noncompliance with the Contract Documents, subsequent retesting occasioned by the noncompliance shall be performed by the same testing agency, and costs thereof will be deducted by the Owner from the Contract Sum.
- C. Contractor Convenience Testing
 - 1. Inspecting and testing performed exclusively for the Contractor's convenience and self verification of compliance shall be the sole responsibility of the Contractor.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. E329, Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

1.4 REQUIREMENTS

- A. Work included:
 - 1. Coordinate and communicate scheduled work processes and cooperate with the Owner's selected testing agency, Engineer, and all others responsible for testing and inspecting the Work.
 - 2. Provide other testing and inspecting as specified to be furnished by the Contractor in this Section and/or elsewhere in the Contract Documents.

3. Where no testing requirements are described, but the Owner directs testing, the Contractor shall provide testing under the requirements of this Specification.

B. Work not included:

1. Selection of testing laboratory: The Owner will select a qualified independent testing laboratory.

1.5 QUALITY ASSURANCE

A. Qualifications

1. The testing laboratory will be qualified to the Owner's approval in accordance with ASTM E329.

B. Regulatory requirements

1. Testing, when required, will be in accordance with all pertinent codes and regulations and with selected standards of the American Society for Testing and Materials.
2. Regulatory Requirements Inspections and tests required by codes or ordinances, or by a plan approved authority, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with pertinent provisions of Section 01 60 00, MATERIALS AND EQUIPMENT.
- B. Promptly process and distribute, to the Engineer, required copies of test reports and instructions to assure necessary retesting and replacement of materials with the least possible delay in progress of the Work.

1.7 SCHEDULING

A. Establishing schedule

1. By advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings.
2. Provide all required time within the construction schedule.
3. Coordinate testing activity with the appropriate testing laboratory.

B. Revising schedule

1. When changes of construction schedule are necessary during construction, coordinate all such changes with the testing laboratory as required.

C. Adherence to schedule

1. When the testing laboratory is ready to test according to the established schedule but is prevented from testing or taking specimens due to incompleteness of the Work, all extra charges for testing attributable to the delay may be back-charged to the Contractor and shall not be borne by the Owner.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Site Tests

1. Representatives of the testing laboratory shall have access to the Work at all times and at all locations where the Work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.
2. All specimens and samples for testing, unless otherwise provided in the Contract Documents, shall be taken by the testing personnel. All sampling equipment and personnel will be provided by the testing laboratory. All deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.

END OF SECTION

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SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Reference material, abbreviations, and terms used in the Construction Documents and establishes edition dates and complete titles for standards referenced elsewhere in the Specifications.

1.2 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Obtain copies of standards when required by Contract Documents.
- C. Maintain copy at jobsite during submittals, planning, and progress of the specific work, until Substantial Completion.
- D. Should specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- E. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.3 SCHEDULE OF REFERENCES

AA Aluminum Association
1400 Crystal Dr. Suite 430
Arlington, VA 22202

AASHTO American Association of State Highway and Transportation Officials
444 North Capitol Street, N.W.
Washington, DC 20001

ACI American Concrete Institute
38800 Country Club Dr.
Farmington Hills, MI 48331-3439

AFBMA Anti-Friction Bearing Manufacturers Association
2025 M. Street, NW
Washington, DC 20036-3309

AGC Associated General Contractors of America
2300 Wilson Blvd.
Arlington, VA 22201

- AGM American Gear Manufacturers Association
1001 N. Fairfax Street
Alexandria, VA 22314-1587
- AI Asphalt Institute
2696 Research Park Drive
Lexington, KY 40511-8480
- AISC American Institute of Steel Construction
One East Wacker Drive
Chicago, IL 60601-1802
- AISI American Iron and Steel Institute
25 Massachusetts Drive
Washington, DC 20001
- AMCA Air Movement and Control Association
30 West University Drive
Arlington Heights, IL 60004
- ANS American National Standard
- ANSI American National Standards Institute
1899 L Street, NW, 11th Floor
Washington, DC 20036
- API American Petroleum Institute
1220 L Street, NW
Washington, DC 20005
- ARI Air-Conditioning and Refrigeration Institute
2111 Wilson Boulevard
Arlington, VA 22201
- ASCE American Society of Civil Engineers
1801 Alexander Bell Drive
Reston, VA 20191
- ASHRAE American Society of Heating, Refrigerating and
Air Conditioning Engineers
1791 Tullie Circle, N.E.
Atlanta, GA 30329
- ASME American Society of Mechanical Engineers
Two Park Avenue
New York, NY 10016-5990
- ASPA American Sod Producers Association

1855 A Hicks Road
Rolling Meadows. IL 60008

ASTM American Society for Testing and Materials
100 Bar Harbor Drive
PO Box C700
West Conshohocken, PA 19428-2959

AWG American or Brown and Sharpe Wire Gage

AWPA American Wood-Preservers' Association
100 Chase Park South
Birmingham, AL 35244-1851

AWS American Welding Society

AWWA American Water Works Association
6666 West Quincy Avenue
Denver, CO 80235

BIA Brick Institute of America
1850 Centennial Park Drive
Reston, VA 20191

CS Commercial Standard

EJCDC Engineers' Joint Contract Document Committee
American Consulting Engineers Council
1015 15th Street, N.W.
Washington, DC 20005

FM Factory Mutual System
1151 Boston-Providence Turnpike
PO Box 688
Norwood, Massachusetts 02062

Fed Spec. Federal Specification
General Services Administration
Specification and Consumer Information Distribution Section (WFSIS)
Washington Navy Yard, Bldg. 197
Washington, DC 20407

HMA Hot Mix Asphalt

IBR Institute of Boiler and Radiator Manufacturers

ICBO International Conference of Building Officials
900 Montclair Road

Birmingham, AL 35213-2298

IPS Iron Pipe Size

JIC Joint Industry Conference Standards

MIL Military Specification
Naval Publications and Forms Center
5801 Tabor Avenue
Philadelphia, PA 19120

NASSCO National Association of Sewer Service Companies
2470 Longstone Lane
Marriottsville, MD 21104

NBS National Bureau of Standards

NCMA National Concrete Masonry Association
13750 Sunrise Valley Drive
Herndon, VA 20171

NCPWB National Certified Pipe Welding Bureau

NEMA National Electrical Manufacturers' Association
1300 North 17th Street
Arlington, VA 22209

NFPA National Fire Protection Association
Battery March Park
Quincy, MA 02269

NPT National Pipe Thread

OS&Y Outside screw and yoke

PCA Portland Cement Association
5420 Old Orchard Road
Skokie, IL 60077

SSHB (Standard Specification)- Massachusetts Standard Specification For Highways and
Bridges, Most Recent Additions With All Supplements.

SMACNA Sheet Metal and Air Conditioning Contractors' National Assoc.
4201 Lafayette Center Drive
Chantilly, VA 20151-1219

Stl. WG U.S. Steel Wire Washburn and Moen, American Steel and Wire
or Roebling Gage

UL Underwriters' Laboratories, Inc.
333 Pfingston Road
Northbrook, IL 60062

USS Gage United States Standard Gage

125-lb. ANS American National Standard for Cast-Iron Pipe Flanges and Flange
250-lb. ANS Fittings, Designation B16.1-1975, for the appropriate class

1.4 EDITION DATES

- A. Reference to publications and reference material shall be understood to mean the latest edition, unless stated otherwise.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. The General Documents, as listed on the Table of Contents, and applicable parts of Division 01, GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Contract Documents and all other Sections of the Specifications for requirements therein affecting the work of this Section.

1.2 DESCRIPTION OF WORK

- A. Work of this Section includes all temporary utilities and facilities, maintenance of access, dust control, noise control, erosion and sediment control, pollution control, surface water control, barriers and enclosures, parking, security, cleaning during construction, and removal of temporary utilities, facilities, and controls.

1.3 RELATED WORK UNDER OTHER SECTIONS

- A. The following items of related work are specified and included in other Sections of the Specifications:
 - 1. Division 1, Section 01 33 00, SUBMITTALS
 - 2. Division 1, Section 01 77 00, CONTRACT CLOSEOUT

1.4 SUBMITTALS - NOT USED

1.5 CLEANING DURING CONSTRUCTION

- A. Unless otherwise specified under the various trade Sections of the Specifications, the General Contractor shall perform clean-up operations during construction as herein specified.
 - 1. Maintain construction entrance tracking pad. Tracked mud, soil or other debris off site is prohibited. Clean entrance to the site regularly, using power brooms, water etc. as required and as directed by the Engineer.
 - 2. Control accumulation of waste materials and rubbish; periodically dispose of waste at an off-site location. Contractor shall bear all costs, including fees resulting from the management and disposal for refuse and debris generated by construction activities.
 - 3. Clean interior areas of the site prior to starting finish work and maintain areas free of dust and other contaminants during finishing operations.
 - 4. Maintain project in accordance with all local, State and Federal Regulatory Requirements.
 - 5. Store volatile wastes in covered metal containers and remove from premises.
 - 6. Prevent accumulation of wastes that create hazardous conditions.

7. Provide adequate ventilation during use of volatile or noxious substances.

B. Protection and Cleaning of Adjacent Pervious Pavement

1. The existing pervious asphalt roadway adjacent to the project area shall be protected from sedimentation and construction debris at all times. Should soil, dust, or other materials be tracked or washed onto the pervious surface, the Contractor shall immediately perform vacuum sweeping using an approved vacuum unit to remove all materials from the pavement voids. Power washing, flushing, or air blowing shall not be permitted on pervious asphalt surfaces. All cleaning shall be conducted as directed by the Engineer and at no additional cost to the Owner.

1.6 DUST CONTROL

- A. Provide adequate means for the purpose of preventing dust caused by construction operations throughout the period of the construction contract.
- B. Regularly assess weather conditions. Provide dust control as necessary to eliminate airborne dust based on wind and exposed soil conditions.
- C. Provide dust control when so directed by the engineer. Dust control methods are subject to approval of the Engineer.

1.7 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize amount of bare soil exposed at one time.
- C. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
- D. Construct fill and waste areas by selective placement to avoid erosive surface silts for clays.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- F. Construct sediment control devices for discharge from dewatering trenches.
- G. Construct all sedimentation control devices shown on the plans and as specified herein or as required by permits issued for the project.

1.8 NOISE CONTROL

- A. Develop and maintain a noise-abatement program and enforce strict discipline over all personnel to keep noise to a minimum.
- B. Execute construction work by methods and by use of equipment which will reduce excess noise.
 - 1. Equip air compressors with silencers, and power equipment with mufflers.
 - 2. Manage vehicular traffic and scheduling to reduce noise.
 - 3. No heavy equipment may be started or idled prior to 7:00 a.m. or after 6:00 p.m.

1.9 POLLUTION CONTROL

- A. Adhere to all Permit requirements. Special care shall be taken to prevent contamination or muddying up or interfering in any way with the stream flows, if any along the line of work. No waste matter of any kind will be allowed to discharge into the stream flows or impounded water of any pools, designated resource areas, or other bodies of water.

1.10 SURFACE WATER CONTROL

- A. Adhere to all permit requirements. Take all precautions to prevent damage to the work or equipment by high waters or by storms. The Engineer with the approval of the Owner may prohibit the carrying out of any work at any time when in his judgment, high water or storm conditions are unfavorable or not suitable, or at any time, regardless of the weather, when proper precautions are not being taken to safeguard previously constructed work or work in progress.
- B. In case of damage caused by the failure of the Contractor to take adequate precautions, the Contractor shall repair or replace equipment damaged and shall make such repairs or rebuild such parts of the damaged work, as the Engineer may require, at no additional expense to the Owner.

1.11 BARRIERS AND ENCLOSURES

- A. Fences and Barricades
 - 1. Provide and maintain temporary fences, barriers, lights, guardrails, and barricades as indicated in the drawings or as specified herein, or as necessary to secure the Work and adjacent property and protect persons and property.
 - 2. Obtain necessary approvals and permits and provide temporary expedients as necessary to accommodate tasks requiring items mentioned herein.
- B. Protection of Trees
 - 1. The Contractor shall take care not to harm trees along the sides of roads or within the existing facility in which the construction work is to be done or trees on adjacent lands except as indicated on the drawings or with the written permission of the Owner and any other owner of the trees involved. Care shall be taken not to cut tree roots so as to harm the growth of trees to remain.
 - 2. If, in the opinion of the Engineer, any trees damaged during construction can be repaired, the Contractor shall satisfactorily repair at no further cost to the Owner.
 - 3. If, in the opinion of the Engineer, any tree damaged during construction cannot be repaired and should be removed, the Contractor shall satisfactorily remove and replace, in kind, same at no further cost to the Owner.

1.12 TEMPORARY CONSTRUCTION FENCE

- A. Construction fences shall be as specified in Section 31 10 00, SITE CLEARING and shall be installed at the discretion of the Contractor so as to protect ongoing work and to provide adequate public safety.
- B. The locations of the fence and gates shall be approved by the Engineer to minimize interference with the work.

- C. The Contractor shall move the fence as required during the work should its location interfere with construction operations at no extra cost.
- D. Fencing shall be removed at such time before final completion as the Representative directs. Restore site to acceptable condition after removing fence.
 - 1. Portable Chain-Link Fencing: Minimum 2-inch, 9-gauge, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch-OD top and bottom rails. Provide concrete bases for supporting posts.
 - 2. Fence Height and Screening: Temporary construction fencing shall be a minimum of 6 feet high and provided with a privacy scrim or mesh fabric covering the full height of the fence. The scrim shall be securely fastened to the fence to prevent tearing, detachment, or wind damage. The scrim color shall be dark green or black, subject to approval by the Engineer. Maintain the fence and scrim in good condition for the duration of construction.

1.13 PARKING

- A. Contractor shall arrange for parking of all workers at an appropriate location. Contractor's employees shall not park in public or private parking areas except as approved by the Engineer. Onsite parking may be permitted at the discretion of the contractor and approved by Engineer. Coordinate with the Engineer and conform to their requirements. Site access and parking shall be coordinated and provided for Phase 2 Contractors.
- B. The Phase 2 Contractor shall be responsible for the removal of any Field Office utilized for that phase of work.

1.14 SECURITY

- A. Provide security and facilities to protect the Work and existing facilities from unauthorized entry, vandalism, or theft.
 - 1. Coordinate with Owner's security program, if any.

1.15 TEMPORARY ELECTRICITY

- A. Provide and pay for power service as needed.

1.16 TEMPORARY WATER SERVICE

- A. Provide and pay for water service as needed.

1.17 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Existing facilities shall not be used.

1.18 REMOVAL OF TEMPORARY UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary above grade or buried utilities, equipment, facilities, materials, fencing and controls, prior to Final Application for Payment inspection.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01 60 00
MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Requirements for delivery, storage, handling and installation of systems, materials, manufactured units, equipment, components, and accessories used in the work.
- B. Related Sections
 - 1. Section 01 33 00, SUBMITTALS

1.2 DELIVERY

- A. Refer to Specifications' Sections for requirements pertaining to delivery and handling of materials and equipment.
- B. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturers' unopened containers or packaging, dry.
- C. Provide equipment and personnel to handle products by methods to prevent soiling or damage.
- D. Promptly inspect shipments to assure that products comply with requirements, that quantities are correct, and products are undamaged.

1.3 STORAGE AND PROTECTION

- A. The Contractor shall use care when receiving and storing and securing materials and products on site. Avoid storage of materials at low elevations.
- B. The Contractor shall monitor the weather and take any necessary measures to relocate, stockpile, cover or otherwise secure all stored materials during severe weather events.
- C. Refer to Specifications' Sections for requirements pertaining to storage and protection of materials and equipment.
- D. Store products in accordance with manufacturers' instruction, with seals and labels intact and legible. Store sensitive products in weather tight enclosures; maintain within temperature and humidity ranges required by manufacturers' instructions.
- E. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.
- F. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.
- G. Arrange storage to provide access for inspection. Periodically inspect to assure that products are undamaged and are maintained under required conditions.

1.4 INSTALLATION STANDARDS

- A. Comply with Specifications and referenced standards as minimum requirements.
- B. Components required to be supplied in quantity within a Specification Section shall be the same and shall be interchangeable.
- C. Do not use materials and equipment removed from existing structures, except as specifically required, or allowed, by the Contract Documents.
- D. Perform work by persons qualified to produce workmanship of specified quality.
- E. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.
- F. When work is specified to comply with manufacturers' instructions, submit copies as specified in Section 01 33 00 - SUBMITTALS, distribute copies to persons involved, and maintain one set in field office.
- G. Perform work in accordance with details of instructions and specified requirements.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 01 77 00
CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Requirements for specific administrative procedures, record keeping, close-out submittals, and forms used at substantial and final completion of the Work.
- B. Contractor shall satisfy all administrative requirements within the Contract Documents and the Requirements listed in this section prior to release of final payment.

1.2 FINAL CLEANING

- A. On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.
- B. The Contractor shall restore or replace, when and as directed, any public or private property damage by his work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end, the Contractor shall do as required, all necessary highway or driveway, walk and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.
- C. Unless otherwise specified under the various Sections of the Specifications, the Contractor shall perform final cleaning operations as herein specified prior to final inspection.
- D. At completion of work, remove waste materials, rubbish tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave project clean and ready for occupancy.
- E. Cleaning shall include all surfaces, interior and exterior in which the Contractor and all Subcontractors have had access whether existing or new.
- F. Refer to Sections of the Specifications for cleaning of specific products or work.
- G. Use only those materials which will not create hazards to health or property and which will not damage surfaces.
- H. Use only those cleaning materials and methods that are recommended by the manufacturer of surfaces material to be cleaned.
- I. Employ experienced workmen, or professional cleaners, for final cleaning operations.

1.3 PROJECT RECORD DOCUMENTS

1.4 WARRANTIES

- A. Provide Manufacturer's warranties for the manufactured products installed unless specified otherwise.

1.5 FINAL INSPECTION

- A. The Contractor shall submit written certification to the Engineer that:
 - 1. Project has been inspected for compliance with Contract Documents.
 - 2. Equipment and systems have been tested in the presence of the manufacturer's representative and are operational and satisfactory.
 - 3. The project punch list has been completed or otherwise resolved to the full satisfaction of the Engineer.
 - 4. The Project is completed, and ready for final inspection.
 - 5. At the completion of the project the Contractor shall submit a final set of Record Drawings for the entire project. The Contractor shall be responsible for including all work performed by Subcontractors and checking the information provided in regard to accuracy and direct any required adjustments to the documents. The Contractor shall certify in writing on the cover sheet of the Record Drawing set that the documents are complete and correct.
 - 6. Submission of these documents to the Engineer is required prior to release of final payment.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 03 20 01
CONCRETE REINFORCEMENT

PART 1 - PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Requirements for reinforcing steel bars, wire fabric and accessories as shown on the drawings, specified herein, and as needed for a complete and proper installation.
- B. Related Sections
 - 1. Section 03 30 00 - CAST-IN-PLACE CONCRETE.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM).
 - 1. A82, Specification for Steel Wire, Plain for Concrete Reinforcement.
 - 2. A185, Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
 - 3. A497, Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
 - 4. A615, Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
 - 5. A706, Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
 - 6. A775, Specification for Epoxy-Coated Reinforcing Steel Bars.
- B. American Concrete Institute (ACI).
 - 1. ACI 318, Building Code Requirements for Structural Concrete.

1.3 SUBMITTALS

- A. In accordance with Section 01 33 00, SUBMITTALS cutting and bending drawings and schedules for all reinforcement to be furnished.
- B. Shop Drawings:
 - 1. Prepare in accordance with Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice and ACI SP-66 Detailing Manual:
 - a. Bending lists.
 - b. Placing drawings.
 - c. Welded splice, Cad weld splice, and mechanical threaded splice.
- C. Quality Control Submittals:
 - 1. Lab test reports for reinforcing steel showing stress-strain curves and ultimate strengths.
 - 2. Mechanical Threaded Connections:

- a. Current International Conference of Building Officials (ICBO) Research Report or equivalent code agency report listing findings to include acceptance, special inspection requirements, and restrictions.
 - b. Manufacturer's instructions.
 - c. Verification that device threads have been checked and meet all requirements for thread quality, in accordance with manufacturer's published methods.
3. Epoxy-Coated Reinforcing Bars: Written certification in accordance with paragraph 4.2.1 of ASTM A775.
4. Welding Qualification: Prior to welding, submit welder qualifications and radiographic nondestructive testing procedures.

1.4 QUALITY ASSURANCE

- A. The steel shall be newly rolled stock substantially free from mill scale, rust, dirt, oil, grease, or other foreign matter. Bars shall be of billet steel and, unless otherwise indicated, shall be Grade 60 bars.
- B. Billet steel bars shall conform to ASTM A 615.
- C. All bars shall be rolled by an acceptable mill. The Contractor shall submit at his own expense certified copies of tests of the bars furnished. The tests shall be as specified in the appropriate ASTM Specification referred to above and shall be made by an acceptable laboratory.
- D. Welder Qualifications: Certified in accordance with AWS D1.4-79.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Unload, store, and handle bars in accordance with CRSI publication "Placing Reinforcing Bars."
- B. Coated Bars:
 1. Protect epoxy-coated bars contact areas from handling equipment.
 2. Lift bundles of coated bars at multiple pickup points to minimize bar-to-bar abrasion from sags in bundles.
 3. Do not drop or drag coated bars or bundles of coated bars.
 4. Store coated bars on protective cribbing.
 5. Color fading of coating is not cause for rejection of epoxy-coated reinforcing bars.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Deformed Billet-Steel Reinforcing Bars:

1. Includes stirrups, ties, and spirals.
 2. ASTM A615, Grade 60, including Supplemental Requirements S1 where welding is not required.
 3. ASTM A706, Grade 60, including Supplemental Requirements for reinforcing to be welded.
- B. Splices and Mechanical Connections:
1. Metal Sleeve: Furnish with cast filler metal, capable of developing, in tension or compression, 125 percent of minimum tensile strength of the bar.
 2. Mechanical Threaded Connections: Furnish metal coupling sleeve for splicing reinforcing in secondary members or in areas of low stress with internal threads engaging threaded ends of bars developing in tension or compression 125 percent of yield strength of bar.
 - a. Manufacturers and Products:
 - 1) Erico Products, Inc., Cleveland, OH; Lenton Reinforcing Steel Couplers.
 - 2) Richmond Screw Anchor Co., Inc. Fort Worth, TX; Richmond DB-SAE Dowel Bar Splicers.
 - 3) Or approved equal.
- C. Epoxy-Coated Reinforcing Bars: ASTM A775, deformed bars, with bond strength not less than 80 percent of uncoated bars.
- D. Welded Wire Fabric:
1. ASTM A185, or A497, and ACI 318/318R, using ASTM A82, wire of 75 ksi minimum tensile strength.
 2. Furnish flat sheets only, rolled sheets not permitted.
- E. Reinforcement shall be accurately formed to the dimensions indicated on the drawings. Stirrups and tie bars shall be bent around a pin having a diameter not less than two times the minimum thickness of the bar. Bends for other bars shall be made around a pin having a diameter not less than six times the minimum thickness except for bars larger than 1 in., in which case the bends shall be made around a pin of eight bar diameters. All bars shall be bent cold.
- F. Bars shall be shipped to the work with bars of the same size and shape fastened in bundles with securely wired-on metal identification tags giving size and mark.
- G. Deformations on bars for concrete reinforcement shall conform to the requirements of the above-mentioned ASTM Specifications.

2.2 ACCESSORY MATERIALS

- A. Tie Wire:
1. Black, soft-annealed 16-gauge wire.
 2. Nylon-, epoxy-, or plastic-coated wire.
- B. Bar Supports and Spacers:

1. Precast concrete bar supports, cementitious fiber-reinforced bar supports, or all-plastic bar supports and side form spacers meeting the requirements of CRSI Manual of Standard Practice. Do not use other types of supports or spacers.
 2. In Beams, Columns, Walls, and Slabs Exposed to View After Stripping: Small rectangular concrete blocks made up of same color and strength as concrete being placed around them or all-plastic bar supports and side form spacers.
 3. Use supports made of dielectric material for epoxy-coated reinforcing bars supported from formwork.
 4. If epoxy-coated reinforcing is used, furnish epoxy-coated reinforcing bars for spreader bars.
 5. Precast concrete supports of same strength as concrete for reinforcing in concrete place don grade.
- C. Welded steel wire fabric shall conform to the ASTM A 185. The gage and spacing of wires shall be as indicated on the drawings.
- D. Soffit Clips: Made of galvanized steel wire not lighter than No. 12 Stl. W.C. They shall be shared so that the greater portion of the wire is held about 1 in. from the flange of the steel beam and shall be spaced not less than 9 in. on centers, the spacing being maintained by suitable longitudinal wires.

2.3 FABRICATION

- A. Follow CRSI Manual of Standard Practice.
- B. Bend all bars cold.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Notify Engineer when reinforcing is ready for inspection and allow sufficient time for inspection prior to placing concrete.
- B. Repair epoxy coating damaged due to handling, shipment, and placing. Repair with patching material in accordance with ASTM A775, and manufacturer's recommendations.
- C. Clean metal reinforcement of loose mill scale, oil, earth, and other contaminants.
- D. Coat wire projecting from precast concrete bar supports with dielectric material, epoxy, or plastic.
- E. Before being placed in position, reinforcement shall be thoroughly cleaned of loose mill and rust scale, dirt, and other coatings, including ice, that tend to interfere with development of proper bond. Where there is delay in depositing concrete after reinforcement is in place, bars shall be reinspected and cleaned when necessary.
- F. Reinforcement which is to be exposed for a considerable length of time after having been placed shall be painted with a heavy coat of cement grout, if required by the Engineer.

3.2 REINFORCING BAR INSTALLATION

- A. Bundle or space bars, instead of bending where construction access through reinforcing is necessary.
- B. Spacing and Positioning: Conform to ACI 318/318R.
- C. Location Tolerances: In accordance with CRSI publication, "Placing Reinforcing Bars".
- D. Splicing:
 - 1. Follow ACI 318/318R.
 - 2. Use lap splices unless otherwise shown or permitted in writing by the Engineer.
 - 3. Welded Splices: Accomplish by full penetration groove welds and develop at least 125 percent of yield strength of bar.
 - 4. Stagger splices in adjacent bars.
 - 5. Metal sleeves may be used.
- E. Mechanical Splices and Connections:
 - 1. Use only in areas specifically approved in writing by the Engineer.
 - 2. Install as required by manufacturer with threads tightened and in accordance with ICBO Research Report.
 - 3. Maintain minimum edge distance and concrete cover.
- F. Tying Deformed Reinforcing Bars:
 - 1. Tie every other intersection on mats made up of Nos. 3, 4, 5, and 6 bars to hold them firmly at required spacing.
 - 2. Bend all noncoated tie wire to prevent tie wire from being closer than 1 inch from the surface of concrete.
 - 3. Epoxy-Coated Bars:
 - a. Use epoxy-coated or nonmetallic clips.
 - b. Repair coating damage at clipped or welded intersection.
- G. Reinforcement Around Openings: Place an equivalent area of steel bars or fabric around pipe or opening and extend as shown, on each side sufficiently to develop bond with each bar. See drawing details.
- H. Welding Reinforcement:
 - 1. Only A706/A706M bars may be welded.
 - 2. Do not perform welding until welder qualifications are approved.
 - 3. Provide suitable ventilation when welding epoxy-coated reinforcing bars.
 - 4. After completion of welding on epoxy-coated reinforcing bars, repair coating damage, welds, and steel splice members with same material as used for repair of coating damage.

- I. Straightening and Re-bending: Field bending of reinforcing steel bars is not permitted.
- J. Unless permitted by Engineer, do not cut reinforcing bars in the field. When epoxy-coated reinforcing bars are cut in the field, coat ends of bars with same material used for repair of coating damage.
- K. Reinforcement shall be accurately positioned as indicated on the drawings and secured against displacement by using annealed iron wire ties or suitable clips at intersections. Concrete blocks having a minimum bearing area of 2 in. by 2 in., and equal in quality to that specified for the slab, shall be used for supporting reinforcing bars for slabs on grade. Where the underside of slabs will be exposed to view in the finished work, stainless-steel supports shall be used.
- L. Furnish and place all concrete reinforcement as indicated on the drawings and as herein specified. Concrete reinforcement in sizes No. 3 (3/8 in.) and larger shall be deformed steel bars of the shapes and sizes indicated on the drawings.

3.3 WELDED WIRE FABRIC INSTALLATION

- A. Extend fabric to within 2 inches of edges of slab, and lap splices at least 1-1/2 courses of fabric or minimum 8 inches.
- B. Tie laps and splices securely at ends and at least every 24 inches with tie wire.
- C. Place welded wire fabric on concrete blocks at correct distance as shown, above bottom of slab and rigidly support equal to that provide for reinforced bars. Do not use broken concrete, brick, or stone.
- D. Follow ACI 318/318R and current Manual of Standard Practice, Welded Wire Fabric.
- E. Do not use fabric that has been rolled. Install flat sheets only.

3.4 TESTS AND INSPECTION

- A. Test 10 percent of all welds using radiographic, nondestructive testing procedures referenced in AWS D1.4-79.
- B. Inspect each splice and verify each component is in accordance with manufacturer's instructions and ICBO Research Report.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Requirements for furnishing and installing forms, reinforcing steel, furnishing and finishing concrete, and expansion and construction joints.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. A185, Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
 - 2. A615, Specification for deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 3. C31, Practice for Making and Curing Concrete Test Cylinders in the Field.
 - 4. C33, Specification for Concrete Aggregates.
 - 5. C39, Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 6. C42, Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - 7. C94, Specification for ready Mixed Concrete.
 - 8. C143, Test Method for Slump of Hydraulic Cement Concrete.
 - 9. C150, Specification for Portland Cement.
 - 10. C172, Practice for Sampling Freshly Mixed Concrete.
 - 11. C231, Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - 12. C260, Test Method for Air-Entraining Admixtures for Concrete.
 - 13. C494, Specification for Chemical Admixtures for Concrete.
 - 14. C920, Specification for Elastomeric Joint sealants.
 - 15. D994, Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
 - 16. D1056, Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
 - 17. D1751, Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
- B. American Concrete Institute (ACI):
 - 1. ACI 301, Specification for Structural Concrete for Buildings.
 - 2. ACI 304, Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
 - 3. ACI 305, Recommended Practice for Hot Weather Concreting.
 - 4. ACI 306, Recommended Practice for Cold Weather Concreting.

5. ACI 315, Building Code Requirements for Reinforced Concrete.
6. ACI 347, Guide to Formwork for Concrete.
- C. Concrete Reinforcing Steel Institute (CRSI):
 1. Manual of Standard Practice.

1.3 SUBMITTALS

- A. Submit Shop Drawings in accordance with Section 01 33 00, SUBMITTALS for the following:
 1. Reinforcing Steel
 - a. Furnish in detail and completeness that all fabrication and placement at the site can be accomplished without the use of contract drawings for reference.
 - b. Include number of pieces, sizes, and grade of reinforcing steel, accessories, and any other information required for fabrication and placement.
 - c. Show joint layout and design.
 - d. Check structural and site drawings for anchor bolts, anchors, inserts, conduits, sleeves, and any other items which are required to be embedded in concrete, and make necessary provisions as required so that reinforcing steel will not interfere with the placement of such embedded items.
 2. Concrete mix designs.
 3. Grout manufacturer / design mix.
 4. Manufacturer's data for ancillary materials such as joint fillers and sealants, epoxy bonding compound.
 5. Batch slips certifying concrete mix, air content, slump, and time of loading.
 6. Shop Drawings of all control and expansion joint layouts. All layouts shall include conformance to requirements as shown on the Drawings and as specified herein.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed exposed aggregate pavement 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. Selection of testing laboratory in accordance with Section 01 41 00, TESTING REQUIREMENTS.
- C. Sample and Test Concrete as follows:
 1. Test Specimens: Make, cure and have tested, a minimum of one set of four test specimens from the concrete of each day's pour and for each fifty cubic yards of concrete cast in accordance with ASTM C172, C31 and C39. One cylinder shall be broken after seven days and three cylinders after twenty-eight days.
 2. Slump: A slump test shall be made for each truckload of concrete in accordance with ASTM C143. Slumps greater than design mix limit will be grounds for rejection of the concrete.

3. Air Content: An air content test shall be made from each day's pour of concrete by the pressure method in accordance with ASTM C231. Air contents above or below the limits specified will be grounds for rejection of the concrete.
4. In the event the compressive strength of the cylinders, when tested, is below the specified minimum, the Engineer may require test cores of the hardened structure to be taken by the Testing Laboratory in accordance with ASTM C42. If such test indicates that the core specimen is below the required strength, the concrete in question shall be removed and replaced without cost to the Owner. Any other work damaged as a result of this concrete removal shall be replaced with new materials to the satisfaction of the Engineer at no additional cost to the Owner. The cost of coring will be deducted from the contract amount. Where the Testing Laboratory has taken core cylinders and the concrete proves to be satisfactory, core holes shall be filled in a manner satisfactory to the Engineer at no additional cost to the Owner.
5. The Contractor shall coordinate the date and location of tests with the Engineer before any concrete work is started.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Reinforcing steel

1. Transport to the site, store, and cover in a manner which will ensure that no damage shall occur to it from moisture, dirt, grease, or any other cause that might impair bond to concrete or chip protective epoxy coating.
2. Store on the site at all times, a supply of approved reinforcing steel to ensure that there will be no delay of the work.
3. Identification of steel shall be maintained after bundles are broken.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement.

1. In accordance with ASTM C150, Type II of U.S. manufacture.
2. Only one brand of cement shall be used on the project.

B. Aggregates.

1. Fine aggregate, in accordance with ASTM C33, clean and graded from 1/4 inch to fines.
2. Coarse aggregate, in accordance with ASTM C33, clean and graded from 1/4 inch to maximum sizes hereinafter specified.

C. Air Entraining Agent.

1. In accordance with ASTM C260.

D. Water Reducing Agent.

1. In accordance with ASTM C494 Type A.

E. Microsilica Admixture.

1. Packaged in easily dispersing form.
- F. Water.
 1. Clean and potable,
 2. Free of impurities detrimental to concrete.
- G. Reinforcing Bars.
 1. New, deformed billet steel bars, in accordance with ASTM A615, Grade 60.
- H. Welded Wire Fabric
 1. In accordance with ASTM A185.
- I. Accessories.
 1. Reinforcement accessories, consisting of spacers, chairs, ties, and similar items shall be provided as required for spacing, assembling, and supporting reinforcement in place.
 2. All accessories shall be dielectric coated steel or approved plastic accessories, conforming to the applicable requirements of the CRSI Standards.
- J. Tie wire.
 1. 16 gauge or heavier black annealed wire.
- K. Form Ties and Spreaders.
 1. Standard metal form clamp assemble and plastic cone, of type acting as spreaders and leaving no metal within 1 inch of concrete face.
 2. Provide form tie with water stop for all walls to be in contact with earth or liquid.
 3. Inner tie rod shall be left in concrete when forms are removed.
 4. No wire ties or wood spreaders will be permitted. Use ½" x 1" C.T. plastic cones for sinkages.
- L. Form Coatings.
 1. Non-grain raising and non-staining type that will not leave residual matter on surface of concrete or adversely affect proper bonding of subsequent application of other material applied to concrete surface.
 2. "Nox-Crete Form Coating" as manufactured by Nox-Crete Company or approved equal.
 3. Coatings containing mineral oils, or the non-drying ingredients will not be permitted.
- M. Grout.
 1. See Section 03 60 10, CEMENTITIOUS GROUT

2.2 CONCRETE STRENGTHS AND PROPORTIONS

- A. Cast-in-place concrete shall have the minimum compressive strength at 28 days as indicated below or as described on the Drawings.
 1. Sidewalks / Walkways – 4,000 PSI
 2. Concrete Pads / Footings – 4,000 PSI

3. Trench Drain / Curb Inlet – 4,000 PSI
4. Other uses – 4,000 PSI
- B. The exact proportions for the mix, including amounts admixture (if any), and water, shall be determined by the concrete supplier.
- C. The proportions of aggregate to cement for any concrete shall be such as to produce a mixture which will work readily into the corners and angles of the forms and around reinforcement with the method of placing employed not, he work, but without permitting the materials to segregate or excess free water to collect on the surface.
- D. Air-Entrainment: The air content in all concrete shall be maintained at 5 to 7 percent.

2.3 PREMOLDED JOINT FILLER

- A. Bituminous Type.
 1. In accordance with ASTM D994 or D1751.
- B. Sponge Rubber Type.
 1. Neoprene, closed cell, expanded in accordance with ASTM D1056, Type 2C5, with a compression deflection, 25 percent deflection (limits), 17 to 24 psi (119 to 168 kPa) minimum.

2.4 POURABLE JOINT FILLERS

- A. Filler for Non-potable Water Structures
 1. Specific Gravity: Greater than 1.0 for cured, in-place filler.
 2. Vertical and Sloped Joints: Furnish gun grade material that will remain as placed in joints and will not run down slope.
 3. Suitable for continuous immersion and exposure to liquid being contained in the structure.

2.5 JOINT SEALANTS

- A. In slabs.
 1. In accordance with ASTM C920 for poured 2-component polyurethane sealant.
 2. Sikaflex-2c, as manufactured by Sika Corporation or approved equivalent.
- B. In walls.
 1. Type II, Class A, compound conforming to Interim Federal Specification TT-S-00227E (3) (COM-NBS) for Sealing Compound; Elastomeric Type, Multi-Component (for Caulking, Sealing, and Glazing in Buildings and Other Structures).
 2. Sikaflex-1a, as manufactured by Sika Corporation or approved equivalent.

2.6 EPOXY BONDING COMPOUND

- A. The epoxy bonding compound shall be a three-component, solvent-free, moisture-tolerant, epoxy modified, cementitious product specifically formulated as a bonding agent and anti-corrosion

coating. The product shall have suitable contact time, fluidity, and application temperature for this type of application.

PART 3 - EXECUTION

3.1 FORMWORK

A. Falsework for Forms

1. Build and maintain necessary false work for the forms.

B. Construction of Forms

1. General

- a. Construct in accordance with ACI 347.
- b. Construct of sound material, to the correct shape and dimensions, mortar tight, of sufficient strength, and so braced and tied together that the movement of men, equipment, materials, or placing and vibrating the concrete will not throw them out of line or position.

2. Embedded Items

- a. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features.
- b. Do not embed wood, other than necessary nailing blocks, in concrete.
- c. Extended complete cooperation to suppliers of embedded items in their installation.
- d. Secure information for embedded items from other trades as required.
- e. Securely anchored embedded items in correct location and alignment prior to placing concrete.

3. Openings for Items Passing Through Concrete

- a. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.
- b. Coordination work of this nature in order that there will be no unnecessary cutting and patching of concrete.
- c. Cutting and repairing of concrete as a result of failure to provide for such openings shall be paid for by the Contractor at no additional expense to the Owner.

C. Removing Forms and False work

1. Forms shall not be removed for at least 72 hours after concrete has been placed.
2. Forms shall not be removed until the concrete has attained sufficient strength to insure stability.

3.2 REINFORCING STEEL

A. General

1. Place reinforcing steel in accordance with the drawings and approved shop drawings and the applicable requirements of the CRSI, Manual of Practice.
 2. Install reinforcement accurately and secure against movement, particularly under the weight of workmen and the placement of concrete.
- B. Reinforcing Steel Supports
1. Support bars on approved plastic or dielectric-coated metal chairs or spacers, accurately placed and securely fastened to forms or steel reinforcement in place.
 2. Supply additional bars, whether specifically shown on the drawings or not, where necessary to securely fasten reinforcement in place.
 3. Support legs of accessories in forms without embedding in form surface.
 4. Spacing of chairs and accessories shall conform to CRSI, Manual of Standard Practice. Accurately space hoops and stirrups and wire to the reinforcement.
 5. Permit no loose wood inside forms.
 6. Lifting of welded wire fabric into proper position while concrete is being poured rather than supporting fabric on chairs will not be permitted.
- C. Placing and Tying
1. Set in place, space, and rigidly and securely tie or wire with tie wire at all splices and at all crossing points and intersections in the positions shown, or as directed.
 2. Re-bending of bars on the job to accommodate the job to accommodate existing conditions will not be permitted without the written approval of the Engineer.
 3. Points ends of wire ties away from forms.
- D. Spacing
1. Minimum center to center distance between parallel bars shall be in accordance with the details on the drawings, or, where not shown, the clear spacing shall be 2 times the bar diameter but in no case less than 1½ inches or less than 1½ times the maximum size aggregate.
- E. Splices
1. Maximum 50% of steel spliced occurring within lap length.
 2. Top bars shall be 1.3 times values given in 3.01.D.5.c.
 3. Splice lengths.
 - a. #6 bars and smaller: 50-bar diameter
 - b. #7 bars and larger: 60-bar diameter
- F. Concrete Covering
1. In accordance with ACI 315, except where shown otherwise on drawings.

3.3 CONCRETE

A. Mixing of Concrete

1. All concrete shall be ready-mixed concrete and shall be mixed and delivered in accordance with ASTM C 94. The batch plant of the concrete producer shall be certified for compliance with the standards established by the National Ready-Mixed Concrete Association.
2. In the event concrete is mixed at a central batching plant, the delivery shall be arranged so that intervals between batches are kept to a minimum, and in any event not more than thirty (30) minutes. Trucks shall be in first class condition and kept in constant rotation during delivery.
3. Concrete shall be placed within 90 minutes after cement has been mixed with aggregate or 45 minutes after addition of water and admixtures.
4. No admixtures, except those mentioned in paragraph 2.1 shall be used. Calcium chloride will not be permitted.
5. Truck delivery slips of all concrete delivered to the job shall indicate the quantity and quality of concrete, additives, date and time of batching and delivery, and the location of placement. Delivery slips shall be forwarded to the Engineer at the end of each pour.

B. Cold Weather Concreting.

1. In accordance with ACI 306.
2. Concrete shall not be mixed or placed when the temperature is below 40 degrees F, or when conditions indicate that the temperature will fall below 40 degrees F within 72 hours from the time of placement unless precautions are taken to protect the concrete. Such precautions must be approved by the Engineer.
3. Concrete temperature shall be maintained, when deposited, at not less than 60 degrees F. Reinforcement, forms, and ground which concrete will contact must be completely free of frost.
4. Concrete and formwork must be kept at a temperature of not less than 50 degrees F. for not less than 96 hours after placing.
5. Calcium chloride shall not be used.

C. Hot Weather Concreting.

1. In accordance with ACI 305.
2. The maximum temperature of the concrete, when deposited, shall be 85 degrees F. If the weather causes the placing temperature to exceed 85 degrees F., the mix shall be cooled by methods approved by the Engineer.
3. No concrete shall be deposited when the air temperature is greater than 90 degrees F.

D. Conveying and Placing Concrete.

1. In accordance with ACI 304.
2. Notification: Before placing concrete, forms shall be thoroughly inspected. All chips, dirt, etc., shall be removed, all temporary bracing and cleats taken out, all openings for pipes, etc., properly boxed, all forms properly secured in their correct position and made tight, all

reinforcement, anchors, and embedded items secured in their proper places. Concrete which maybe on the forms or reinforcement, and which is set and dry, shall be cleaned off, and the forms and steel washed off before proceeding. Remove all foreign matter from forms and excavations.

3. Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the Engineer. Any flow of water into an excavation shall be diverted through proper side drains into a sump or shall be removed by other approved methods which will avoid washing away the freshly deposited concrete.
4. Soil on which concrete will be poured shall be thoroughly wetted (except in freezing weather).
5. Anchors and Embedded Items: Anchors, bolts, sleeves, inserts, wood blocking, and any other items to be embedded in concrete shall be accurately secured in position before the concrete is placed. Aluminum shall not be embedded in concrete.
6. Handling and Depositing
 - a. Before any concrete is placed, notify all whose work is in any way connected with or influenced by the concrete work, and give them reasonable time to complete all portions of their work that must be completed before concrete is deposited.
 - b. Immediately before concrete is placed, inspect all forms to ensure that they are in proper position, sufficiently rigid, thoroughly clean, properly oiled, and free from foreign materials, and that all reinforcement is in proper position.
 - c. Concreting, once started, shall be carried on as a continuous operation until the section of approved size and shape is completed.
 - d. Concrete shall be conveyed as rapidly as practicable from the mixer to the place of final deposit by methods that prevent the separation or loss of ingredients. It shall be deposited, as nearly as practicable, in its final position to avoid rehandling or flowing.
 - e. Concrete shall not be dropped freely where reinforcement will cause segregation, nor shall it be dropped freely more than six (6) feet. Concrete shall be deposited to maintain a plastic surface approximately horizontal.
 - f. Concrete that has partially hardened shall not be deposited in the work.
7. Pumping
 - a. Concrete may be placed by pumping if first approved in writing by the Engineer for the location proposed.
 - b. Equipment for pumping shall be of such size and design as to ensure a practically continuous flow of concrete at the delivery end without separation of materials.
 - c. The concrete mix shall be designed to the same requirements as herein before specified and may be richer in lubricating components in order to allow proper pumping.
 - d. Concrete shall not be pumped through aluminum pipes.
8. Vibrating and Compacting
 - a. All concrete shall be thoroughly consolidated and compacted by suitable means during the operation of placing, and shall be thoroughly worked around reinforcement,

embedded items, and into the corners of the forms. All concrete against forms shall be thoroughly spaded. Internal vibrators shall be used under experienced supervision and shall be kept out of contact with reinforcement and wood forms. Vibrators shall not be used in a manner that forces mortar between individual form members.

- b. Vibrators shall be flexible electric type or approved compressed air type, adequately powered and capable of transmitting to the concrete not less than seven thousand (7,000) impulses per minute. Vibration shall be sufficiently intense to cause the concrete to flow or settle readily into place without separation of the ingredients. A sufficient number of vibrators shall be employed so that complete compaction is secured throughout the entire volume of each layer of concrete. At least one (1) vibrator shall be kept in readiness as a spare for emergency use. Vibrators shall be such that the concrete becomes uniformly plastic with their use.
- c. Vibration shall be close to the forms but shall not be continued at one spot to the extent that large areas of grout are formed, or the heavier aggregates are caused to settle. Care shall be taken to not disturb concrete that has its initial set.
- d. Where conditions make compacting difficult, or where the reinforcement is congested, batches of mortar containing the same proportions of cement to sand as used in the concrete shall first be deposited in the forms, to a depth of at least one inch.
- e. The responsibility for providing fully filled out, smooth, clean, and properly aligned surfaces free from objectionable pockets shall rest entirely with the Contractor.

3.4 FINISHING

A. Cement Concrete Pavement

- 1. Cement Concrete Pavement shall be a non-slip broom finish.

B. Walkway Contraction Joints

- 1. Shall be tooled into the concrete surface to a depth of one-fourth the thickness of the concrete.
- 2. The spacing of contraction joints shall be per the plans or at maximum intervals of 12 times the thickness of the concrete.

C. Walkway Expansion Joints

- 1. Expansion Joints shall be placed a maximum spacing of 30 feet.
- 2. Provide expansion joint material against all walls, light posts, manhole structures, and other objects that could restrain the movement of the concrete.

D. Construction Joints

- 1. Construction joints shall be located a maximum of 40 feet apart. If, for any reason, the contractor feels a change is necessary, he shall prepare a placing plan and submit it to the Engineer for approval.
- 2. Where a joint is to be made, the surface of the concrete shall be sandblasted or thoroughly picked, thoroughly cleaned, and all laitance removed. In addition to the foregoing, joints shall be thoroughly wetted, but not saturated, and slushed with a coat of grout immediately before the placing of new concrete.

3. Approved keys shall be used at all joints, unless detailed otherwise.
4. Forms shall be retightened before placing of concrete is continued. There shall be an interval of at least 48 hours between adjacent pours.
5. Bonding Concrete at Construction Joints
 - a. To new concrete construction joints:
 - 1) Thoroughly clean and saturate joint with water.
 - 2) Cover horizontal wall surfaces as specified in this Section, and immediately place concrete.
 - 3) Limit concrete lift placed immediately on top of bonding compound to 12 inches thick.
 - 4) Thoroughly vibrate to mix and consolidate bonding compound and concrete together.
- E. Bonding new concrete to old concrete:
 1. Mechanically roughen existing concrete surfaces to a clean, rough surface using appropriate mechanical means to remove the existing concrete surface and provide a minimum roughness profile of $\frac{1}{4}$ -inch.
 2. Saturate surface with water for 24 hours, cover with epoxy bonding compound and place concrete as specified for new concrete.
- F. Expansion Joints
 1. Expansion joints shall be located as shown on contract drawings.
 2. The joint shall include a joint filler, a bond breaker and joint sealant and installed as indicated on contract drawings.
- G. Joint Sealants.
 1. Prepare surface in accordance with manufacturer's directions.
 2. Apply primer as recommended by sealant manufacturer.
 3. Install sealant with the proper tools and methods as directed by the sealant manufacturer.
- H. Patching
 1. Immediately after stripping forms, patch minor defects, form-tie holes, honeycombed areas, etc., before concrete is thoroughly dry.
 2. Repair gravel pockets by cutting out to solid surface, form key, and thoroughly wet before placing patching mortar consisting of 1 part cement to 2 parts fine sand; compact into place and neatly finish. Honeycombed areas or gravel pockets which, in the Engineer's opinion are too large and unsatisfactory for mortar patching as described above, shall be cut out to solid surface, keyed, and packed solids with matching concrete to produce firm bond and surface.
 3. The Contractor shall do all the cutting as required by himself or other trades. All such work shall be of the minimum size required. No excessive cutting will be permitted, or shall any structural members or reinforcement be cut.
 4. The Contractor shall do all patching after work by other trades has been installed, where required, using Portland Cement Mortar 1:2 mix.

I. Protection and Curing

1. Protect concrete from injurious action of the elements and defacement of any nature during construction operations.
2. Keep concrete in a thoroughly moist condition from the time it is placed until it has cured, for at least (7) days.
3. Carefully protect exposed concrete corners from damage.
4. Allow no slabs to become dry at any time until curing operations are complete. In general, slabs shall be cured with non-staining curing paper, hosing or fog spray; vertical surfaces shall be curing with Burlene or fog spray or an approved curing compound.
5. Protect fresh concrete from drying winds, rain, damage, or spoiling. Curing paper shall be lapped 4 inches minimum at joints and sealed with waterproof tape.

J. Concrete Finishes

1. Unexposed Surfaces: All unexposed surfaces shall have any form finish, at the Contractor's option.
2. Wearing Surface Finish: Float the surface by hand using a wooden or magnesium float. Finish with a flexible bristle broom. Permit surface to harden sufficiently to retain the scoring or ridges. Broom transverse to traffic or at right angles to the slope of the slab.
3. Addition of Material: The addition of cement, sand, water, or mortar to slab surfaces while finishing concrete is strictly prohibited.

K. Defective Work

1. The following concrete work shall be considered defective and may be ordered by the Engineer to be removed and replaced at Contractor's expense:
 - a. Incorrectly formed.
 - b. Not plumb or level.
 - c. Not specified strength.
 - d. Containing rock pockets, voids, honeycomb, or cold joints.
 - e. Containing wood or foreign matter.
 - f. Otherwise not in accordance with the intent of the Drawings and Specifications.

END OF SECTION

SECTION 11 68 13
PLAYGROUND EQUIPMENT

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment, and transportation required to install/assemble the play equipment as located, described, and set forth in the contract plans, specifications, and details and in accordance with manufacturer's requirements and recommendations, and as specified herein. The Town of Hopkinton will purchase the play equipment, delivery time and location shall be coordinated with Contractor. Storage and installation of the equipment shall be the responsibility of the Contractor. Please note the current schedule for delivery is set for (TBD).

1.2 REFERENCES

- A. Playground equipment design, layout, and installation shall comply with the following standards and guidelines, as applicable:
1. CPSC - Consumer Product Safety Commission Guidelines for Playground Safety, latest edition.
 2. ASTM - American Society for Testing and Materials, Designation: F 1487, Standard Consumer Safety Performance Specification for Playground Equipment for Public Use, latest edition.
 3. ANSI - American National Standards Institute.
 4. AASHTO - American Association of State Highway and Transportation Officials (tests of specifications).
 5. MassDOT. - Latest edition of the Standard Specifications for Highways, Bridges and Waterways,
 6. MAAB - Massachusetts Architectural Access Board
- B. Requirements not specifically set forth herein but required by the agencies listed above shall be understood to be a requirement of this contract since these standards of quality and safety are established as the industry standard(s). Any conflicts between the agency standards and the contract documents shall be brought to the attention of the Owner's Representative, and unless otherwise directed in writing, the agency standards shall be the minimum requirement to be followed.

1.3 SUBMITTALS

- A. Shop Drawings, submit in accordance with Section 01 30 00 – SUBMITTALS.
1. Include catalog cut sheets for all manufactured playground equipment
 2. Review all equipment stockpiled on site and provide a list of missing, incorrectly located and/or damaged pieces. This may be provided incrementally for each item.

3. Confirm receipt of all installation instructions needed.
4. Shop drawings shall certify compliance with all applicable ASTM, CPSC, and MAAB standards. If compliance with any specification is not possible due to manufacturing limitations, Contractor shall submit a complete written summary of non-compliant elements for review.

1.4 QUALITY ASSURANCE

- A. Contractor shall provide a Certified Playground Safety inspection. The Certified Playground Safety Inspector shall inspect the completed installation. A signed certificate of compliance confirming adherence to ASTM and CPSC standards shall be submitted to the Owner prior to final acceptance.
- B. The Contractor and the manufacturer shall hold the Owner and the Designer harmless from any and all claims, damages, or liability resulting from negligent acts or omissions by the Contractor or manufacturer, or from defective materials, components, or improper installation.
- C. Contractor installing the playground shall be certified to install LSI equipment.
 1. Contractor shall provide documented experience of at least three (3) playgrounds installed with equipment valued at over \$100,000.
 2. Installer shall have a minimum of five (5) years' experience installing playgrounds of similar size. References will be required.

1.5 RELATED DOCUMENTS

- A. Reference the manufacturer's plans, details, specifications, and related product information contained in the Appendix.

PART 2 - PRODUCTS

2.1 PLAYGROUND EQUIPMENT

- A. Base Bid

Qty	Vendor / Model No.	Description
1 ea	#CP000256A	DTR PB 30" Wide Stainless Steel Slide with Poly Hood for 64" Elevation; includes (1) #171539 Ramp Deck Extension, (1) #120901A Grab Bar, and (2) #160694A Barrier with Infill Panel
1 ea	#323659	Volo (without shade)
1 ea	#173591A	OmniSpin Spinner® Surface Mount
1 ea	#214438A	Rhapsody® Animato® Metallophone, Direct Bury
1 ea	#214442A	Rhapsody® Grandioso® Chimes, Direct Bury

1 ea	#173592A	Oodle® Swing
1 ea	#189490A	We-Saw
1 ea	#248819A	We-Go-Round, Perforated Panels, 2 Seats
1 ea	#355992B	Symbol Communication Sign, English/Spanish with Posts
1 ea	#182503C	Welcome Sign, 5–12 ages
1 ea	#221292A	3-Bay 5" Arch Swing Frame, 8' Beam Height; includes (2) Molded Bucket Seats with Harness, (2) Belt Seats, and (1) Friendship Swing
1 ea	#277778A	We-Go-Swing with 1 Accessible Bay

A. Add Alt 1

1. N/A

B. Add Alt 2 (This item will be provided by a different vendor)

1 ea	453-9BD Miracle Machine	Miracle Machines – GOOOAAALLL
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C. Add Alt 3

1 ea	(Club House Assembly)	Includes (1) #169319A Recycled Wood Grain Lumber Panel, (1) #345276A Storefront Panel, (1) #345279A Table Panel, (1) #120818A Playstructure Seat, (2) #158997A Pod Seats, and (1) #211190A Tree House Roof with Stack and "Kids Only" Sign
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2.2 POLYURETHANE SAFETY SURFACING

- A. Polyurethane safety surface shall be installed as shown on the Drawings and meet the requirements as specified in Section 32 12 45 of the Specifications.

2.3 CAST IN PLACE CONCRETE

- A. Concrete footings for play equipment shall be installed as shown on the plans will be cast in place cement concrete as specified in Section 03 30 00 of the Specifications and per the manufacturer's requirements.
- B. Top of concrete footings shall be twelve (12) inches minimum below finished grade or as per the manufacturer's requirements.

2.4 MAINTENANCE KIT

- A. The Contractor shall supply the Town with all equipment maintenance kits and spare hardware that came with the equipment.

PART 3 - EXECUTION

- A. Receiving: Contractor shall unload the play equipment. The Contractor shall provide appropriate equipment for unloading the equipment including items such as a: dock, forklift, or appropriate manpower to remove the shipment from the truck in a timely manner. The equipment ships on pallets. The Contractor shall ensure the correct number of pieces of equipment, and check freight for signs of damage such as torn packaging, punctures, broken bands, etc. and communicate with vendor and carrier. Contractor shall clearly note issues on the carrier's copy of the delivery receipt in as much detail as possible. Failure to do so may void the carrier's responsibility to honor a freight claim of any issues of damage or missing items on the day of receiving.
 - 1. Post Delivery: If any shortages or damages are noted on the delivery receipt, please notify Lesa at O'Brien & Sons immediately. For shortages, please advise which piece(s) you are missing along with a description. For any damage, take photos to document the packaging and condition of the item(s) in question. Provide the pictures along with descriptions of damage directly to Lesa at lesa_rogers@obrienandsons.com.
- B. The Contractor shall provide secure storage for all playground equipment delivered to the site until installed. Responsibility for safeguarding stored materials shall rest solely with the Contractor.
- C. The Contractor shall assemble the specified equipment under the supervision of an approved Supervisor according to the manufacturer's instructions, the contract drawings, and these Specifications.
- D. The Contractor shall locate the structures to the lines and grades specified in the drawings in these Specifications and according to the specifications of the manufacturer of the equipment. Adjust all equipment to suit site gradients; no sloping platforms, tracks, or members intended to be horizontal shall be accepted.
- E. The equipment shall be located and brought to the heights as shown in the drawings and as recommended by the manufacturer with vertical and horizontal members set plumb and then braced to be held in place.
- F. The concrete shall be poured around the supporting pieces of the equipment to the grades detailed. The concrete shall be poured and cured according to Section 03 30 00 of these Specifications. Slope tops of footings to drain; set bottom of vertical members into gravel base to ensure drainage. Contractor shall consult manufacturer to confirm that concrete footings meet the requirements of the manufacturer.
- G. After the specified cure period of the concrete has passed the bracing may be removed.
- H. The fills and surfaces shall then be placed and brought to the grades shown in the Contract Drawings.

END OF SECTION

SECTION 31 05 16
AGGREGATE FOR EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Related documents:

1. American Association of State Highway and Transportation Officials (AASHTO).
 - a. T11, Amount of Material Finer than 0.075 mm Sieve in Aggregate
 - b. T27, Sieve Analysis of Fine and Coarse Aggregates.
2. American Society for Testing and Materials (ASTM).
 - a. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
3. 2023 Commonwealth of Massachusetts Department of Transportation Standard Specifications for Highways and Bridges (Standard Specifications)

B. Section includes, without limitation, providing:

1. Requirements for furnishing and placing materials, which include Crushed Stone, Gravel Borrow, Dense Graded Crushed Stone and Selected Borrow.
2. Location of specified materials as detailed on the Drawings or as directed by the Engineer for roadway base, sidewalk base, structural fill, excavation below normal depth, utility support, replacement of unsuitable material or elsewhere, as ordered.

C. Extents: As shown.

D. Definitions

1. Gravel Borrow as per Section M1.03.0 of the Standard Specifications.
2. Crushed Stone as per Section M2.01.0 of the Standard Specifications, per gradation table,
3. Peastone (Filter Blanket) as per Section M2.01.6 of the Standard Specifications
4. Dense Graded Crushed Stone as per Section M2.01.7 of the Standard Specifications.
5. Sand Borrow as per Section M1.04.0 Sand Borrow of the Standard Specifications
6. Stone for Pipe Ends as per Section M2.02.3 of the Standard Specifications

E. Submittals

1. Shop Drawings
 - a. Provide sieve analysis when gradation requirements are given in the Specification.

2. Samples

- a. Furnish representative sample including location of source with Shop Drawing transmittal sheet.
- F. Quality Assurance
 - 1. Field Samples
 - a. All materials furnished by the Contractor to be incorporated into the Work shall be subject to the inspection of the Engineer. The Engineer shall be the sole judge as to the acceptability of proposed materials and said judgment shall be final, conclusive, and binding.
- G. Delivery, Storage and Handling
 - 1. Handling
 - a. Handle, haul, and distribute materials and all surplus materials on the different portions of the Work, required to complete the Work in accordance with the Contract Documents.
 - b. Provide suitable storage room for materials and equipment during the progress of the Work, and be responsible for the protection, loss of, or damage to materials and equipment furnished under this Contract, until the final completion and acceptance of the Work.
 - c. Pay all storage and demurrage charges by transportation companies and vendors.
 - 2. Storage of Excavated Material
 - a. Place excavated materials and equipment to be incorporated in the Work so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the Work.
 - b. Materials shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.
- H. Related sections, without limitation, include:
 - 1. Section 31 20 00, EARTH MOVING
 - 2. Section 32 10 00, ASPHALT PAVING

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Crushed Stone
 - 1. Gradation on accordance with Table M2.01.0-1 Tabulation of Stone Sizes – Percent by Weight Passing Through of the Standard Specifications.
 - 2. For bedding and pipe zone material for pipe larger than 3 inches diameter. Well graded in size from 3/8 inches to 3/4 inches or such other sizes as may be approved.

3. For bedding and pipe zone material for plastic pipe 3 inches diameter and less, maximum particle size shall be 3/8 inches.
 4. Clean, hard, and durable particles or fragments, free from dirt, vegetation, or other objectionable matter, and free from an excess of soft, thin elongated, laminated or disintegrated pieces.
 5. Screened Stone of similar size and grading to this specification may be used instead of Crushed Stone.
- B. Gravel Borrow
1. Granular material well graded from fine to coarse with a maximum size of 3 inches, obtained from approved natural deposits and unprocessed except for the removal of unacceptable material and stones larger than the maximum size permitted.
 2. Gravel shall not contain vegetation, masses of roots, or individual roots more than 18 inches long or more than 1/2 inches in diameter.
 3. Gravel shall be substantially free from loam and other organic matter, clay and other fine or harmful substances.
 4. Gradation requirements for gravel shall be in accordance with Table M1.03.0-1 Gradation Requirements for Gravel Borrow of the Standard Specifications.
- C. Peastone
1. Crushed Stone material of even gradation
 2. Aggregate shall be 3/8" in size, and be in accordance with MassDOT standard M2.01.6
 3. Peastone shall be comprised of hard durable particles of stone.
- D. Dense Graded Crushed Stone
1. Sub-base material combining crusher-run coarse aggregates of crushed stone and fine aggregates uniformly premixed with a predetermined quantity of water.
 2. Coarse aggregate shall consist of hard, durable particles or fragments of stone.
 3. Materials that break up when alternately frozen and thawed or wetted and dried shall not be used.
 4. Coarse aggregate shall have a percentage of wear, by the Los Angeles test, of not more than 45.
 5. Fine aggregate shall consist of natural or crushed sand. The composite material shall be free from clay, loam or other plastic material.
 6. Dense Graded Crushed shall meet the gradation requirements in Table M2.01.7-1 Gradation Requirements for Dense Graded Crushed Stone for Subbase of the Standard Specifications.
- E. Sand Borrow

1. Shall consist of clean inert, hard, durable grains of quartz or other hard durable rock, free from loam or clay, surface coatings and deleterious materials.
2. The allowable amount of material passing a No. 200 sieve as determined by AASHTO T 11 shall not exceed 10% by weight.
3. Maximum particle size shall be $\frac{1}{4}$ inch.
4. Sand Borrow shall meet the requirements of Section M1.04.0 Sand Borrow of the Standard Specifications, with the exception that processed glass aggregate shall not be used.

F. Stone for Pipe Ends

1. Shall be sound, durable rock which is angular in shape. Rounded stones, boulders, sandstone or similar stone or relatively thin slabs will not be acceptable.
2. Each stone shall weigh not less than 50 lb not more than 125 lb.
3. At least 75% of the volume shall consist of stones weighing not less than 75 lb each.

2.2 SOURCE QUALITY CONTROL

A. Test, Inspection

1. Engineer may elect to sample material supplied at the source.
2. Assist the Engineer and/or personnel from the designated testing laboratory in obtaining samples.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Crushed Stone

1. Spread in layers of uniform thickness not greater than 6 inches.
2. Compact thoroughly by means of a suitable vibrator or mechanical tamper.

B. Gravel Borrow

1. Spread in layers of uniform thickness not exceeding 8 inches before compaction and moistened or allowed to dry as directed.
2. Compact thoroughly by means of rollers, suitable power-driven tampers or other power-driven equipment.
3. Compaction shall conform to 95% of minimum dry density per ASTM D1557.
4. The percolation rate for the compacted bank-run gravel shall not exceed 5 minutes per inch.

C. Dense Graded Crushed Stone

1. Spread in uniform layers not exceeding 6 inches before compaction and moistened and allowed to dry.

2. Compact thoroughly by means of rollers, suitable power-driven tampers or other power-driven equipment unless otherwise directed by the Engineer.
 3. Examine structure and conditions for compliance with requirements
- D. Sand Borrow
1. Store so as to prevent contamination with organics, stone, roots or other deleterious materials.
 2. Compact subgrade area to receive sand borrow in accordance with Section 3.2 below.
 3. Spread uniformly throughout the excavated area to provide a level, stable surface.
 4. Avoid contaminating sand with adjacent soils when backfilling and spreading.
- E. Stone for Pipe Ends
1. Place stone to line and grade as shown on the plans or as directed on a prepared bed of embankment material or existing materials.
 2. Each stone shall be carefully placed by hand, normal to the slope and firmly bedded thereon, unless otherwise methods of placement are approved by the Engineer.
 3. Larger stones shall be placed directly at the drainage end to prevent erosion and displacement
 4. Remainder of stones shall be so graded that when placed with the larger stones, the entire mass will be compact with a minimum percentage of voids and minimum thickness of 6 in.

3.2 BASE PREPARATION

- A. Before placing of any fill, the base areas shall be cleared, and stripped of organic materials and shall be free from soft, spongy areas.
- B. Frozen material shall not be placed for any base material under areas to receive embankment, structures, pavement or other areas of the work.
- C. Any stone with a dimension greater than that permitted for the type of gravel specified shall be removed from the sub-base before the gravel is compacted.
- D. For roadways, compaction shall continue until the surface is even and true to the proposed lines and grades within a tolerance of $\frac{3}{8}$ in. above or below the required cross-sectional elevations and to a maximum irregularity not exceeding $\frac{3}{8}$ in. under a 10-ft line longitudinally.
- E. Any specific area of gravel sub-base which, after being rolled, does not form a satisfactory, solid, stable foundation shall be removed, replaced and recompact by the contractor without extra compensation

3.3 FIELD QUALITY CONTROL

- A. Material and compaction testing
 1. In accordance with SECTION 01 41 00 TESTING REQUIREMENTS.
 2. Proceed with installation only after unsatisfactory conditions have been corrected.

END OF SECTION

SECTION 31 05 19.13
GEOTEXTILES FOR EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents

1. American Society for Testing and Materials (ASTM)
 - a. D3786, Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method
 - b. D4355, Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
 - c. D4491, Test Method for Water Permeability of Geotextiles by Permittivity
 - d. D4533, Test Method for Trapezoid Tearing Strength of Geotextiles
 - e. D4632, Test Method for Grab Breaking Load and Elongation of Geotextiles
 - f. D4751, Test Method for Determining Apparent Opening Size of a Geotextile
 - g. D4833, Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
 - h. D5261, Measuring Mass Per Unit Area of Geotextiles.
 - i. D6241, Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.
 - j. D4759-02, Standard Practice for Determining the Specification Conformance of Geosynthetics
 - k. D6637, Standard Test Method For Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method
 - l. D7737-11, Standard Test Method for Individual Geogrid Junction Strength
 - m. D7748/D7748M-14, Standard Test Method for Flexural Rigidity of Geogrids, Geotextiles, and Related Products
 - n. D7864/D7864M-15, Standard Test Method for Determining the Aperture Stability Modulus of Geogrids
 - o. D4355-05, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus

B. Section Includes, without limitation, providing:

1. Requirements for installation of geotextile filter fabric in trenches and under riprap.
2. Requirements for installation of Geogrid under pavements.

C. Related Sections

1. Section 31 05 16, AGGREGATES FOR EARTHWORK
2. Section 31 20 00, EARTH MOVING

1.2 QUALITY ASSURANCE

A. General

1. Producer of fabric and geogrid to maintain competent laboratory at point of manufacture to insure quality control in accordance with ASTM testing procedures.
2. Laboratory to maintain records of quality control results.

1.3 SUBMITTALS

A. Shop Drawings

1. Submit in accordance with requirements for submittals.
2. Include manufacturer's recommended method of joining of adjacent fabric and geogrid panels.

B. Certificate of Conformance

1. Upon each shipment/delivery of product to the work site, furnish mill certificate(s) from the company manufacturing the fabric or geogrid attesting that the product meets the chemical, physical, manufacturing and performance requirements specified. Product will be rejected if it is found to have defects, rips, flaws, deterioration, or other damage.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Provide product in rolls wrapped with a heavy-duty protective covering to protect from mud, dirt, dust, debris, and other deleterious sources until it is installed. Label each roll with number or symbol to identify production run.
- B. Do not expose fabric to ultraviolet radiation (sunlight) for more than 20 days total in period of time following manufacture until fabric is installed and covered.
- C. If Engineer determines material is damaged in any way or has excessive sunlight exposure, the Contractor shall immediately make all repairs and replacements as directed by the Engineer, at no additional cost to the Owner.

1.5 SCHEDULING

- A. Schedule Work so that the covering of the fabric or geogrid with a layer of the cover material is accomplished immediately after inspection and approval of the placed fabric by the Engineer. Failure to comply with this requirement may require replacement of the fabric or geogrid.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER/MATERIAL – GEOTEXTILE FABRIC

- A. The geotextile fabric shall be nonwoven polypropylene designated as MIRAFL 140N as manufactured by Nicolon Corporation/Mirafi Group, Norcross, Georgia; or acceptable equivalent and shall meet the following minimum requirements:

Property (Unit)	Unit	Test Method	Minimum Requirements
Weight	oz/sy	ASTM D5261	4.3
Grab Tensile Strength	lbs	ASTM D4632	120
Grab Tensile Elongation	%	ASTM D4632	50
Mullen Burst Strength	psi	ASTM D3786	240
Puncture Strength	lbs	ASTM D6241	310
Trapezoid Tear Strength	lbs	ASTM D4533	50
Apparent Opening Size (AOS)	US Std. Sieve (mm)	ASTM D4751	70 (0.21)
Permittivity	sec -1	ASTM D4491	1.5
Permeability	cm/sec	ASTM D4491	0.22
Flow Rate	gal/min/sf	ASTM D4491	120
Ultraviolet Resistance (strength retained at 500 hrs)	%	ASTM D4355	70

- B. To keep the number of overlay joints to a minimum, fabric shall be provided in sections not less than 12.5 feet in width unless otherwise approved by the Engineer prior to delivery to the site.

2.2 ACCEPTABLE MANUFACTURER/MATERIAL – GEOGRID

- A. Geogrid shall be geogrid designated as NX 750 as manufactured by Tensar Corporation, a division of CMC, Alpharetta, Georgia; or acceptable equivalent.
- B. Geogrid shall be manufactured from a coextruded, composite polymer sheet, punched and oriented, and designed for base stabilization and subgrade improvement.
- C. Geogrid shall satisfy the following general properties:

Aperture shapes	Hexagonal, Trapezoidal, & Triangular
Structure	Coextruded & Integrally Formed
Rib shape	Rectangular
Continuous parallel rib pitch(2), mm (in)	80 (3.2)
Rib aspect ratio(3)	> 1.0
Node thickness(2), mm (in)	3.5 (0.14)
Color identification	White / Black / White

PART 3 - EXECUTION

3.1 SUBGRADE PREPARATION

- A. For Riprap

1. Prepared areas to receive geotextile in accordance with Section 31 20 00, EARTH MOVING.
2. Clear subgrade of all sharp objects, large stones, roots, debris, or any other foreign materials that may contribute to puncturing, shearing, rupturing, or tearing of the geotextile.
3. Grade area as smooth as possible and compact in accordance with Section 31 20 00, EARTH MOVING, with a vibratory roller or other method approved by the Engineer.
4. Inspect subgrade and repair all unstable areas or soft spots with the installation of gravel and recompact prior to the placement of geotextile.

3.2 FABRIC INSTALLATION

A. Fabric Installation in Trenches

1. In accordance with manufacturers recommendations
2. Place fabric in trench prior to placing crushed stone pipe bedding.
3. Overlap fabric 18-inches minimum for unsewn lap joints.
4. Do not permit equipment to travel directly on fabric.
5. Place fabric in smooth condition to prevent tearing or puncture.
6. Lay fabric loosely, without wrinkles or creases.
7. Leave slack in fabric to allow for adjustment.

3.3 GEOGRID INSTALLATION

- A. Place at the locations shown on the Contract Drawings.
- B. Install in accordance with manufacturer's recommendations.
- C. Unroll directly onto the first layer of gravel subbase in a continuous manner. Join adjacent sections in accordance with manufacturer's recommendations.
- D. Lay geogrid smooth, maximizing surface contact with the ground, free of tension, stress, folds, wrinkles, or creases.
- E. Spread cover material in a manner that avoids creating undue tension, stress, sagging, buckling and/or other movement of the underlying fabric.

3.4 PROTECTION

- A. Protect the work before, during and after installation, and protect the installed work covered by other Sections.

3.5 REPAIR

- A. Geotextile fabric damaged during installation shall be repaired by a piece of geotextile material cut, placed, and adequately anchored over the damaged area, subject to a 3-foot minimum overlap requirement or as directed by the Engineer.

- B. If detrimental movement of the geotextile fabric occurs during any step of the installation, as determined solely by the Engineer, the Contractor shall remove the cover material and/or sections of fabric to the limits deemed necessary and reinstall the fabric.
- C. Any fabric damage during its installation or during placement of cover materials shall be replaced by the Contractor at no additional cost to the Owner.

END OF SECTION

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SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section 01 11 00, SUMMARY OF WORK.

1.2 SUMMARY

- A. This Section includes, without limitation, the following:
 - 1. Protecting existing trees and vegetation to remain including installation of protective fencing, fencing, tree protection and any temporary safety barricade.
 - 2. Removing trees, shrubs and other vegetation.
 - 3. Clearing and grubbing.
 - 4. Topsoil and subsoil stripping and stockpiling.
 - 5. Removing above-grade site improvements for off-site disposal.
 - 6. Salvage of above-grade site improvements for re-use on site.
 - 7. Removal of designated pavements.
- B. Related Sections include the following:
 - 1. Division 01 Section 01 50 00, TEMPORARY FACILITIES AND CONTROLS,
 - 2. Division 31 Section 31 20 00, EARTH MOVING,
 - 3. Division 32 Section 32 01 93 CONTROL OF INVASIVE PLANT SPECIES,
 - 4. Division 32 Section 32 92 19, SEEDING AND LAWN ESTABLISHMENT,

1.3 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer (typically the A horizon) 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; free of subsoil, clay lumps, gravel, and other objects more than [2 inches] in diameter; and free of weeds, roots, and other deleterious materials. Limited topsoil exists at this site. Refer to Geotechnical Report.
- B. Subsoil: Naturally occurring weathered moraine material, typical 12"-24" depth located immediately under the topsoil and atop the residual moraine material.
- C. Remnant Pavement: Friable bituminous asphalt, consisting of tar and sand layers, found in portions of previously developed areas of the site, typically 3"-8" below the surface.

- D. Standard Specifications or SSHB: "Standard Specifications for Highways and Bridges", Commonwealth of Massachusetts, Department of Transportation, 2023 edition, including all supplements.
- E. Remove and Dispose: Separate, cut, excavate or otherwise detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- F. Remove and Salvage: Detach items from existing construction and deliver them to Owner.
- G. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- H. 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 MATERIALS OWNERSHIP

- A. Except for materials indicated to be stockpiled or to remain Owner's property, all cleared and demolished materials shall become Contractor's property and shall be removed from the site.

1.5 SUBMITTALS

- A. Qualified arborist, licensed in Massachusetts, with minimum of five (5) years of experience, to plan and manage the clearing and grubbing work.
- B. Product data for fencing and related materials to protect existing vegetation.
- C. Photographic documentation, sufficiently detailed, of existing vegetation or conditions of trees and plantings, adjoining construction, and site improvements that might be adversely impacted by site clearing.
- D. Record drawings according to Division 1, Section 01 77 00, CONTRACT CLOSEOUT.
 - 1. Identify and accurately locate capped utilities and other subsurface structural, electrical, and mechanical conditions..

1.6 QUALITY ASSURANCE

- A. Preconstruction Conference: Conduct conference and site walk at to review limits of work at the Project site. Comply with requirements in Division 1, Section 01 01 90, COORDINATION AND MEETINGS. Coordinate meeting to include full review of project sediment and erosion control requirements.
- B. All work shall comply with all codes, rules, regulations, laws, and ordinances for the Town/City and the Commonwealth of Massachusetts, and all other authorities having jurisdiction.

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 indicated removal and alteration work on property adjoining Owner's property will be obtained by Owner before award of Contract.
 1. Peripheral areas outside the Contract limit line shall not be disturbed or used for storing materials.
- C. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- D. Notify utility locator service for area where Project is located before site clearing.
- E. Review and verify all limits or improvements to be removed prior to commencing demolition operations.
- F. Inspection: Verify existing condition of all items scheduled for demolition or removal. The Owner assumes no responsibility for the actual condition of structures or utilities to be demolished. Do not proceed with any work that will result with unsafe conditions causing a continuing or permanent hazard. Ascertain that all work scheduled for demolition can be safely accomplished in a proper time period.
- G. Benchmarks: Protect all survey monuments, benchmarks, and property boundary pins. Replace if destroyed by Contractor's operations. Relocate designated monuments where and as directed by the Owner or Engineer. Coordinate and schedule work with Owner.
- H. Permits/Fees: Coordinate with appropriate utility companies and pay any disconnect fees and obtain permits as necessary.
- I. Provide 48 hour notice to the Engineer and Owner prior to conducting any site clearing, grubbing and demolition operation. Limits must be approved prior to start of work.

PART 2 - PRODUCTS

2.1 PROTECTIVE FENCING

- A. Snow Fence: Wood slat snow fence comprised of 3/8" x 1.5" slats secured between a minimum of four strands of 14.ga. metal wire, minimum of 4'-0" in height.
- B. Metal Fence Posts: Steel U-shaped, posts, with loops to secure fence, 6'-0" minimum.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Identify and/or establish on-site Benchmarks in locations convenient for construction operations. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly flag all limits of clearing, including trees and vegetation to remain or to be relocated. Place flagging every 25' oc. Review with Engineer, Landscape Architect, Town Planning & Conservation Staff, and Owner for acceptance.

- C. Adjust path and trail alignments, edges of work limits if so directed to preserve specimen trees, shrubs, or other sensitive vegetation or habitats if so identified and directed.
- D. Coordinate work with Invasive Plant Management operations. Adjust limits as necessary to accomplish invasive plant management work integrally to the clearing and grubbing operations.
- E. Avoid distributing invasive plant roots, vegetation, bark, seeds, etc. during any removal work. Follow the protocols of the approved IPMS Plan.
- F. Adjustments to clearing, grubbing, and pruning operations shall typically be made with off-set adjustments by shifting alignments to avoid trees and site features, modifying the footprint of work but not significantly altering the area of work, and as such shall be incidental to the project unless determined to have other significant differences from the work shown on the plans. Coordinate with the Engineer adjustments during staking operations.
- G. Protect existing any extant trees and site improvements shown to remain from damage during construction. Restore damaged improvements to their original condition, as acceptable to Owner.
- H. Provide erosion control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. Refer to Division 31, Section, 31 25 00 EROSION AND SEDIMENT CONTROL.

3.2 TREE PROTECTION

- A. Erect and maintain protective fencing at the edge of all vegetation shown to remain that is adjacent to the Work and around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete. Post spacing shall be 6'-0" on center. Securely attach fencing to posts, including providing a top tension line, woven through top of fabric.
 - 1. Do not store construction materials, debris, or excavated material within drip line of remaining trees.
 - 2. Do not permit vehicles, equipment, or foot traffic within drip line of existing trees to remain.
- B. Do not excavate within drip line of existing trees to remain, unless otherwise indicated.
- C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and then cleanly cut roots as close to excavation as possible.
 - 1. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
 - 2. Coat cut faces of roots more than 1-1/2 inches in diameter with tree pruning sealer formulated pruning cut and tree injuries. .
 - 3. If so, directed by the Engineer, cover exposed roots with wet burlap to prevent roots from drying out. 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 Engineer.
 - 1. Replace trees that cannot be repaired and restored, as determined by the qualified arborist.

3.3 UTILITIES

- A. Use care when working near existing utilities where shown to remain. The Contractor shall coordinate site clearing and grubbing work with overhead power lines on site. Arrange for disconnecting, removal and or sealing of utilities shown to be removed or abandoned.

3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots. Selectively clear trees and prune branches within 20' of clearing limit line or property line. Pruning to conform to Class III Standards.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Selectively prune and 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. Cut vegetation resulting in exposed stumps at the edges of the Limit of Work may be able to be ground down to 3" below grade. Review each location with the Engineer for acceptance of this approach.
 - 4. Typically, where site improvements are shown, completely remove stumps, roots, obstructions, and debris extending to a depth of 36 inches below finish grade.
 - 5. Unless approved otherwise, use only hand methods for grubbing within drip line of remaining trees.
 - 6. Along property lines, notify Engineer before beginning clearing operations. Coordinate clearing, grubbing and selective pruning with Engineer, to maintain as much existing vegetation as is practical.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory on-site material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding 8-inch loose depth and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

- A. The site has limited topsoil and mixed soil horizons. Identify any material that can be salvaged and stockpiled for re-use.
- B. When working in wooded areas, manage soil for re-use in proximity to where excavation operations generated the material. Avoid unnecessary movement of soils.
- C. Strip topsoil materials to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Strip surface soil of unsuitable topsoil, including trash, debris, weeds, roots, and other waste materials.
 - 2. Where trees are indicated to remain, hold stripping a sufficient distance away to prevent damage to the root system.

- D. Stockpile materials away from edge of excavations without intermixing with other soil materials. Grade and shape stockpiles to drain surface water, in locations approved by the Owner and consistent with sediment and erosion control requirements.
 - 1. Do not stockpile topsoil within drip line of trees shown to remain.

3.6 SITE IMPROVEMENTS

- A. Remove existing above and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove all slabs, foundations, paving, curbs, gutters, and all base/subbase material as indicated to full depths encountered, unless specifically noted otherwise.
 - 1. Neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically, perpendicular and or when appropriate, parallel to direction of traffic.
 - 2. The Contractor shall remove existing surficial pavements from site unless an alternative approach such as crushing for on-site use is approved by the Engineer.
- C. Remove existing site improvements, including pavements, fences of various types, and signage.

3.7 DISPOSAL

- A. Disposal: Remove unsuitable soil material, debris, rubbish, concrete, asphalt cleared and grubbed material, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner's property. No burning or burying on site is permitted.
- B. Accumulation of disposal/waste materials on-site is not permitted.
- C. All pavement demolition material remains the property of the Contractor except as specifically noted to be retained or permitted to be re-used on-site.

3.8 MAINTENANCE

- A. Maintain all fencing in good condition for the duration of the project. Replace damaged sections or posts as required as part of the Work.
- B. The Contractor shall maintain all areas within the project limits, for the duration of the contract. This maintenance will include the line-trimming or mowing of excessive weed or grass growth, within project limits, as well as routine collection and removal of branches, rubbish, and any other similar debris generated or found on the job site.

END OF SECTION

SECTION 31 20 00

EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes, without limitation, providing:
 - 1. Requirements for; cutting, filling, shaping, excavating in earth for trenches and structures; backfilling excavations; furnishing necessary fill and aggregate materials compaction; constructing embankments and fills; miscellaneous earth excavations and miscellaneous grading.
- B. Intent:
 - 1. The project requires re-use of onsite soils to the maximum extent possible. Topsoil material where found on site may be stockpiled for possible re-use. Existing soils shall be cut, shaped, excavated, stockpiled and re-distributed for use as on-site fill (Type OS Fill) as indicated on the plans and as directed by the Engineer. Once on site materials have been fully utilized and placed, imported, ordinary fill may be utilized.
- C. Extent:
 - 1. Applicable to all excavation, grading, shaping, cutting, excavating utility trenches, compacting, backfilling and all associated civil site work.
 - 2. Applicable to excavation, compacting and backfilling for structures and foundations.
 - 3. Section shall not be applicable to landscaping elements and associated work. Earth moving requirements applicable to landscaping elements shall be found in the landscaping / planting specifications.
- D. Related documents:
 - 1. Commonwealth of Massachusetts Department of Transportation, 2023 Standard Specifications for Highways and Bridges, including all addenda, (referred to as the Standard Specification).
 - 2. American Society for Testing and Materials (ASTM).
 - 3. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
- E. Quality Assurance
 - 1. Field Samples
 - a. Provide samples of materials as requested by the Engineer, to the Quality Control Engineer hired by the Owner, prior to delivery of materials on site, in order to facilitate field testing of compaction operations and material properties.
 - 2. Project/ Site Conditions
 - a. Existing Conditions

- 1) There may be pipes, drains, and other utilities in locations not indicated on drawings, no attempt has been made to show all services and completeness or accuracy of information given is not guaranteed.
3. Maintenance
 - a. Maintain sitework in accordance with SECTION 31 25 00 EROSION & SEDIMENT CONTROL.
 - b. Provide and maintain all necessary safety protections for excavations.
- F. Related sections, without limitation, include:
 1. Section 01 41 00, TESTING REQUIREMENTS
 2. Section 03 30 00, CAST-IN-PLACE CONCRETE
 3. Section 31 05 16, AGGREGATE FOR EARTHWORK

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Trench and Excavation Backfill
 1. In general, and unless other material is indicated on drawings or specified, material used for backfilling trenches and excavations shall be suitable material which was removed in the course of making the construction excavations. If sufficient suitable material is not available from the excavations, the backfill material shall be crushed stone, or gravel borrow as directed by the Engineer, in according to respective Specification Sections.
- B. Filling and Embankment Backfill
 1. Suitable select on-site material (Type OS Fill) available from site grading, and excavations determined not required for backfill around pipes or against structures may be used for filling and building embankments, except if otherwise specified. Material needed in addition to that available from construction operations on site shall be obtained from suitable gravel banks or other suitable off-site sources.
 2. Imported Ordinary Fill shall be used for embankments when suitable material from excavation is not available, and use of other aggregate materials are not specified or directed by the Engineer.
 - a. Ordinary Fill shall consist of an off-site material satisfactory to the Engineer and not specified as gravel borrow, sand borrow, or other particular kind of borrow.
 - b. The material shall have the physical characteristics of soils designated as group A-1, A-2-4 or A-3 under AASHTO M 145. It shall have properties such that it may be readily spread and compacted for the formation of embankments.
- C. Additional materials
 1. Crushed stone: In accordance with SECTION 31 05 16, AGGREGATES FOR EARTHWORK.
 2. Gravel borrow: In accordance with SECTION 31 05 16, AGGREGATES FOR EARTHWORK.

2.2 EQUIPMENT

- A. Well Points
 - 1. Designed to drain soil and prevent saturated soil from flowing into excavation.
- B. Pumping Units
 - 1. Designed for use with the well points, capable of maintaining a high vacuum and handling large volumes of air and water at the same time.
- C. Underdrain Pipe
 - 1. Perforated HDPE pipe enclosed in crushed stone encased in filter fabric.

2.3 SOURCE QUALITY CONTROL

- A. Provide Engineer with access to location of offsite sources of materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify all existing utilities and facilities prior to excavation.

3.2 PROTECTION

- A. Utilities
 - 1. Support and protect from damage existing pipes, poles, wires, fences, curbing, property line markers, and other structures, which the Engineer decides must be preserved in place without being temporarily or permanently relocated.

Restore items damaged during construction without compensation, to a condition at least equal prior to construction.

- B. Paved surfaces
 - 1. Do not use or operate tractors, bulldozers, or other power-operated equipment with treads or wheels shaped as to cut or injure paved surfaces.
 - 2. All surfaces which have been injured by the Contractor's operations shall be restored to a condition at least equal to which existed prior to start of the Work.
 - 3. Suitable materials and methods shall be used for such restoration.

3.3 PREPARATION

- A. Pavement Removal
 - 1. Remove only existing pavement as necessary for the prosecution of the work.

2. Engineer may require that pavement be cut with pneumatic tools or saws without extra compensation to Contractor, where in the opinion of the Engineer it is necessary to prevent damage to the remaining road surface.
 3. Dispose of large pieces of broken pavement before proceeding with excavation.
- B. Topsoil Removal
1. From areas which excavations are to be made, loam and topsoil shall be carefully removed and separately stored to be used again as directed; or, if the Contractor prefers not to separate surface materials, he shall furnish, as directed, loam and topsoil at least equal in quantity and quality to that excavated.
- C. Subgrade
1. Remove loam and topsoil, loose vegetable matter, stumps, large roots, etc., from areas where embankments will be built, or material will be placed for grading.
 2. Shape as indicated on the drawings and prepare by forking, furrowing, or plowing to bond first layer of the new material placed.

3.4 RELOCATION AND REPLACEMENT OF EXISTING STRUCTURES

- A. The structures to which the provisions of this article apply include pipes, wires, and other structures which meet all the following:
1. Are not indicated on the drawings or otherwise provided for.
 2. Encroach upon or are encountered near and substantially parallel to the edge of the excavation.
 3. In the opinion of the Engineer will impede progress to such an extent that satisfactory construction cannot proceed until they have been changed in location, removed (to be later restored), or replaced.
- B. In removing existing pipes or other structures, the Contractor should use care to avoid damage to materials, and the Engineer shall include for payment only those new materials which, in his judgment, are necessary to replace those unavoidably damaged.
- C. Whenever the Contractor encounters certain existing structures as described above and is so ordered in writing, he shall do the whole or such portions of the work as he may be directed to change the location of, remove and later restore, or replace such structures, or to assist the Owner thereof in so doing. For all such work, the Contractor shall be paid under such items of work as may be applicable, otherwise as Extra Work.
- D. When fences interfere with the Contractor's operations, he shall remove and (unless otherwise specified) later restore them to a condition which existed prior to the start of the Work, all without additional compensation. The restoration of fences shall be done as promptly as possible and not left until the end of the construction period.

3.5 SHEETING AND BRACING

- A. Furnish, put in place, and maintain such sheeting, bracing, etc., as necessary to support the sides of the excavation and to prevent any movement of earth which could in any way diminish the

width of the excavation to less than that necessary for proper construction, or could otherwise injure or delay the work, or endanger adjacent structures.

- B. Whenever possible, sheeting shall be driven ahead of the excavation to avoid loss of material from behind the sheeting. If it is necessary to excavate below the sheeting, care shall be taken to avoid trimming behind the face along which the sheeting will be driven. Care shall be taken to prevent voids outside of the sheeting, but, if voids occur, they shall be filled immediately with sand and compacted.
- C. Leave in place to be embedded in the backfill, or concrete, all sheeting, bracing, etc., which is indicated on the drawings to be left in place. Leave in place any and all other sheeting, bracing, etc., which the Engineer may direct to leave in place, at any time during the progress of the work, for the purpose of preventing injury to structures or property.
- D. The Engineer may direct that sheeting and bracing to be left in place be cut off at any specified elevation.
- E. All sheeting and bracing not to be left in place shall be carefully removed in such manner as not to endanger the construction or other structures. All voids left or caused by the withdrawal of sheeting shall be backfilled immediately using suitable materials and compaction methods.

3.6 DEWATERING

- A. Ensure proper conditions at all times during construction, provide and maintain ample means and devices (including spare units kept ready for immediate use in case of breakdowns) to intercept and/or remove promptly and dispose properly all water entering trenches and other excavations. Keep excavations dry until the structures, pipes, and appurtenances to be built therein have been completed to such extent that they will not be floated or otherwise damaged.
- B. Dispose of all water pumped or drained from the work in a suitable manner without undue interference with other work, damage to pavements, other surfaces, or property. Provide suitable temporary pipes, flumes, or channels for water that may flow along or across the site of the work.
- C. Provide adequate sedimentation and/or erosion control methods at all times to ensure soil stabilization and protection of surrounding areas including any designated wetlands and/or waterways encountered.
- D. Underdrains
 - 1. Temporary underdrains, if used, shall be laid in trenches beneath the grade of the structure. Trenches shall be of suitable dimensions to provide room for the chosen size of underdrain and its surrounding gravel.
 - 2. Underdrains, if used, shall be laid at a suitable distance below the bottom of the normal excavation and with open joints wrapped in cheesecloth or filter fabric approved by the Engineer, and surrounded by graded gravel, or crushed stone to prevent the admission of sand or other soil into the underdrains. The distance between the bottom of the pipe or structure and the top of the bell of the underdrain pipe shall be at least 3 in. unless otherwise permitted. The space between the underdrain and the pipe or structure shall be filled with graded gravel or crushed stone which shall be rammed if necessary and left with a surface suitable for laying the pipe or building the structure.

E. Drainage Well Point System.

1. If necessary, dewater the excavations by means of an efficient drainage wellpoint system which will drain the soil and prevent saturated soil from flowing into the excavation.
2. The installation of the wellpoints and pump shall be done under the supervision of a competent representative of the manufacturer. The Contractor shall do all special work such as surrounding the wellpoints with sand or gravel or other work which is necessary for the wellpoint system to operate for the successful dewatering of the excavations.

3.7 EXCAVATION

- A. Execute operation of dewatering, sheeting, and bracing without undermining or disturbing foundations of existing structures or of work previously completed under this contract.
- B. Excavate to widths that provide suitable room for:
 1. Building structures or laying and jointing piping.
 2. Placing all sheeting, bracing, and supports.
 3. Cofferdamming, pumping and draining.
- C. Render bottom of excavations firm, dry and acceptable in all respects.
- D. Do not plow, scrape, or dig by machinery, earth at finished subgrade which results in disturbance of material below subgrade, unless indicated or specified, and remove with pick and shovel, last of material to be excavated, just before placing pipe, masonry, or other structure.
- E. Make all excavations in open, except as otherwise specified or permitted.
- F. Excavation Near Existing Facilities
 1. As the excavation approaches pipes, conduits, or other underground structures, digging by machinery shall be discontinued and the excavation shall be done by means of hand tools. Such manual excavation when incidental to normal excavation shall be included in the work to be done under items involving normal excavation.
- G. Unauthorized Excavation
 1. If the bottom of any excavation is taken out beyond the limits indicated or prescribed, the resulting void shall be backfilled at the Contractor's expense with thoroughly compacted gravel borrow, if the excavation was for a pipeline, or with Class B concrete, if the excavation was for a masonry structure.
- H. Unsuitable Material
 1. If material unsuitable for foundation (in the opinion of the Engineer) is found at or below the grade to which excavation would normally be carried in accordance with the drawings and/or specifications, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted, crushed stone, gravel borrow, fine aggregate or concrete as directed.

3.8 TRENCHING

A. Trench Excavation

1. Where pipe is to be laid in specified bedding material or concrete cradle, the trench may be excavated by machinery to, or to just below, the designated subgrade, provided that the material remaining at the bottom of the trench is no more than slightly disturbed, as approved by the Engineer.
 2. Where pipe is to be laid directly on the trench bottom, the lower part of trenches in earth shall not be excavated to subgrade by machinery, but, just before the pipe is to be placed, the last of the material to be excavated shall be removed by means of hand tools to form a flat or shaped bottom, true to grade, so that the pipe will have a uniform and continuous bearing and support on firm and undisturbed material between joints except for limited areas where the use of pipe slings may have disturbed the bottom.
- B. Depth Of Trench
1. Excavate trench to depths permitting the pipe to be laid at the elevations, slopes, or depths of cover indicated on the drawings, and at uniform slopes between indicated elevations.
- C. Width Of Trench
1. Excavate trench as narrow as practicable and do not widen by scraping or loosening materials from the sides. Every effort shall be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed and consolidated.
 2. Excavate trenches with approximately vertical sides between the elevation of the center of the pipe and an elevation 1 ft. above the top of the pipe.
- D. Trench Excavation Infill
1. If pipe is to be laid in embankments or other recently filled material, the material shall first be placed to the top of the fill or to a height of at least 1 ft. above the top of the pipe, whichever is the lesser. Particular care shall be taken to ensure maximum consolidation of material under the pipe location. The pipe trench shall then be excavated as though in undisturbed material.
- E. Length of trench open at any one time will be controlled by conditions, subject to any limits that may be prescribed by Engineer.

3.9 BACKFILLING

- A. General
1. Frozen material shall not be placed in the backfill nor shall backfill be placed upon frozen material. Previously frozen material shall be removed or shall be otherwise treated as required, before new backfill is placed.
- B. Fill And Backfill Under Structures
1. The fill and backfill materials shall be placed in layers not exceeding 6 in. in thickness. Unless otherwise indicated or specified, each layer shall be compacted to 95 percent in accordance with ASTM D1557.
- C. Backfilling Around Structures
1. Do not place backfill against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected,

without distortion, cracking, or other damage. As soon as practicable after the structures are structurally adequate and other necessary work has been done, special leakage tests, if required, shall be made. Promptly after the completion of such tests, the backfilling shall be started and then shall proceed until its completion. The best of the excavated materials shall be used in backfilling within 2 ft. of the structure. Unequal soil pressures shall be avoided by depositing the material evenly around the structure.

2. The material shall be placed and compacted to 90 percent in accordance with ASTM D1557 unless otherwise indicated or specified.

D. Backfilling Pipe Trenches

1. As soon as practicable after the pipes have been laid and the joints have acquired a suitable degree of hardness, if applicable, or the structures have been built and are structurally adequate to support the loads, including construction loads to which they will be subjected, the backfilling shall be started and thereafter it shall proceed until its completion.
2. With the exception mentioned below in this paragraph, trenches shall not be backfilled at pipe joints until after that section of the pipeline has successfully passed any specified tests required. Should the Contractor wish to minimize the maintenance of lights and barricades and the obstruction of traffic, he may, at his own risk backfill the entire trench, omitting or including backfill at joints as soon as practicable after the joints have acquired a suitable degree of hardness, if applicable, and the related structures have acquired a suitable degree of strength. He shall, however, be responsible for removing and later replacing such backfill, at his own expense, should he be ordered to do so in order to locate and repair or replace leaking or defective joints or pipe.
3. No stone or rock fragment larger than 12 in. in greatest dimension shall be placed in the backfill nor shall large masses of backfill material be dropped into the trench in such a manner as to endanger the pipeline. If necessary, a timber grillage shall be used to break the fall of material dropped from a height of more than 5 ft. Pieces of bituminous pavement shall be excluded from the backfill unless their use is expressly permitted, in which case they shall be broken up as directed.
4. Zone Around Pipe
 - a. Backfilled with the materials and to the limits indicated on the drawings.
 - b. Material shall be compacted to 90 percent by tamping.
5. Remainder of Trench
 - a. Compact by water-jetting, or tamping, in accordance with the nature of the material to 95 percent in accordance with ASTM D1557. Water-jetting may be used wherever the material does not contain so much clay or loam as to delay or prevent satisfactory drainage. However, tamping shall be used if water-jetting does not compact the material to the density required.
6. Excavated material which is acceptable to the Engineer for surfacing or pavement subbase shall be placed at the top of the backfill to such depths as may be specified elsewhere or as directed. The surface shall be brought to the required grade and stones raked out and removed.

E. Placing And Compacting Embankment Material

1. After the subgrade has been prepared as hereinbefore specified, the material shall be placed thereon and built up in successive layers until it has reached the required elevation.
2. Layers shall not exceed 12 in. thickness before compaction. In embankments at structures, the layers shall have a slight downward slope away from the structure; in other embankments the layers shall have a slight downward slope away from the center. In general, the finer and less pervious materials shall be placed against the structures or in the center, and the coarser and more pervious materials, upon the outer parts of embankments.
3. Each layer of material shall be compacted by the use of approved rollers or other approved means so as to secure a dense, stable, and thoroughly compacted mass. At such points as cannot be reached by mobile mechanical equipment, the materials shall be thoroughly compacted by the use of suitable power-driven tampers.
4. Previously placed or new materials shall be moistened by sprinkling, if required, to ensure proper bond and compaction. No compacting shall be done when the material is too wet, from either rain or too great an application of water, to compact it properly; at such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compaction, or such other precautions shall be taken as may be necessary to obtain proper compaction.
5. The portion of embankments constructed below proposed structures shall be compacted to 95 percent in accordance with ASTM D1557. The top 2 ft. of an embankment below a pavement base shall be compacted to 95 percent. All other embankments shall be compacted to 90 percent in accordance with ASTM D1557.

3.10 METHODS OF COMPACTION

A. Water-Jetting

1. Saturate backfill material throughout its full depth and at frequent intervals across and along the trench until all slumping ceases.
2. Furnish one or more jet pipes, each of sufficient length to reach the specified depth and of sufficient diameter (not less than 1-1/4 in.) to supply an adequate flow of water to compact the material.
3. Equip jet pipe with a quick-acting valve, supply water through a fire hose from a hydrant or a pump having adequate pressure and capacity to achieve the required results.

B. Tamping and Rolling

1. Deposit backfill material and spread in uniform, parallel layers not exceeding 8 in. thick before compaction. Before the next layer is placed, each layer shall be tamped to obtain a thoroughly compacted mass. Care shall be taken that the material close to the bank, as well as in all other portions of the trench, is thoroughly compacted. When the trench width and the depth to which backfill has been placed are sufficient to make it feasible, and it can be done effectively and without damage to the pipe, backfill may, on approval, be compacted by the use of suitable rollers, tractors, or similar power equipment instead

of by tamping. For compaction by tamping (or rolling), the rate at which backfilling material is deposited in the trench shall not exceed that permitted by the facilities for its spreading, leveling, and compacting.

2. If necessary to ensure proper compaction by tamping (or rolling), the backfill material shall first be wet by sprinkling. However, no compaction by tamping (or rolling) shall be done when the material is too wet either from rain or too great an application of water to be compacted properly; at such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compacting, or such other precautions shall be taken as may be necessary to obtain proper compaction.

C. Miscellaneous Requirements.

1. Whatever method of compacting backfill is used, care shall be taken that stones and lumps shall not become nested and that all voids between stones shall be completely filled with fine material. Only suitable quantities of stones and rock fragments shall be used in the backfill; the Contractor shall, as part of the work done under the items involving earth excavation and rock excavation as appropriate, furnish and place all other necessary backfill material.
2. All voids left by the removal of sheeting shall be completely backfilled with suitable materials, and thoroughly compacted.

3.11 DISPOSAL OF SURPLUS EXCAVATED MATERIALS

- A. No excavated materials shall be removed from the site of the work or disposed of by the Contractor except as directed or permitted by the Engineer.
- B. Surplus excavated materials suitable for backfill shall be used to backfill normal excavations in rock or to replace other materials unacceptable for use as backfill; shall be neatly deposited and graded so as to make or widen fills, flatten side slopes, or fill depressions; or shall be neatly deposited for other purposes within a haul of 1 mile from the point of excavation; all as directed or permitted and without additional compensation.
- C. Surplus excavated materials not needed as specified above shall be hauled away and dumped by the Contractor, at his expense, at appropriate locations, and in accordance with arrangements made by him.

3.12 DISPOSAL OF SPECIAL WASTES (IN MASSACHUSETTS)

- A. The Contractor's attention is directed to the requirements set forth by the State of Massachusetts, Department of Environmental Protection, (Mass DEP) regarding "Special Hazardous Wastes" and the proper disposal thereof. All waste materials and debris, as designated by the Owner and/or Engineer, including but not limited to any sewers, storm drains, catch basins, and combined system pipelines and associated structures, or any portions thereof, including but not limited to sludge, grit, sediment, dirt, sand, rock, grease, roots and other liquid, solid or semi-solid materials contained therein, shall be considered Special Hazardous Waste" In addition, any excavated soils contaminated in any manner, as designated by the Owner and/or Engineer, shall also fall under this category and shall be handled the same. When so encountered, all such materials and debris shall be removed to the extent so ordered by the Engineer and properly disposed of in strict compliance with the requirements of the Mass DEP,

Division of Waste Management, Rules, and Regulations for Hazardous Waste Management, amended 4/19/92. and other regulating authorities to an approved and certified waste disposal site. It shall remain the sole responsibility of the Contractor to apply for and obtain all required permits, bonds and/or insurance relative to such disposal. The Contractor shall also pay all costs associated with the disposal, required permits, bonds and insurance with no additional expense to the Owner. All handling of such "Special Hazardous Waste" shall be done in strict compliance with the Mass DEP requirements and/or any other federal, state, or local agency having jurisdiction or authority over the same. Under no circumstances shall sewage, solids or other "Special Hazardous Wastes" removed from the sewer lines be dumped or spilled onto the streets or into ditches, catch basins or storm drains. The Contractor must use watertight and State approved vehicles in transporting any wastes as hereinbefore designated.

- B. The Contractor shall indemnify and save harmless the Owner and Engineer and all persons acting for or on behalf of the Owner and Engineer from all claims and liability of any nature or kind, and all damages, costs and expenses, including attorney's fees and penalties, arising from the improper handling, transportation or disposal of "Special Hazardous Wastes" as determined by the MA DEP and/or any other federal, state or local agency having jurisdiction or authority over the same.

3.13 DUST CONTROL

- A. During the progress of the Work, maintain the area of activities, by sweeping and sprinkling of streets to minimize the creation and dispersion of dust. If the Engineer decides that it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread the material, as directed.

3.14 BRIDGING TRENCHES

- A. Provide suitable and safe bridges and other crossings where required for the accommodation of travel, and to provide access to private property during construction. Remove once bridges and crossings are no longer needed.

3.15 FIELD QUALITY CONTROL

- A. Site Tests - In accordance with SECTION 01 41 00 – TESTING SERVICES REQUIREMENTS.

3.16 CARE AND RESTORATION OF PROPERTY

- A. Restoration of existing property or structures done as promptly as practicable and not left until the end of the construction period.

END OF SECTION

SECTION 31 25 00
EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. The General Documents, as listed on the Table of Contents, and applicable parts of Division 01, GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Contract Documents and all other Sections of the Specifications for requirements therein affecting the work of this Section.

1.2 DESCRIPTION OF WORK

- A. The work of this Section consists of furnishing and installing, maintaining, and removing various erosion and sedimentation controls including, but limited to, silt fence, compost filter tubes, jute mesh netting, and silt sacks.

1.3 RELATED WORK UNDER OTHER SECTIONS

- A. The following items of related work are specified and included in other Sections of the Specifications:
 - 1. Section 31 10 00, SITE CLEARING,
 - 2. Section 31 20 00, EARTH MOVING,
 - 3. Section 32 92 19, SEEDING AND GRASS ESTABLISHMENT,

1.4 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00 SUBMITTALS,
 - 1. Product Information – submit manufacturer's product data and installation method for silt fence, compost filter tubes, compost, jute mesh netting, and silk sacks.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Provide fabric in rolls wrapped in original packaging or heavy-duty covering to protect fabric from mud, dirt, dust, debris, and other deleterious sources until it is installed.

1.6 SCHEDULING

- A. Schedule work so that Erosion Control measures are installed prior to any site clearing or demolition. Erosion Control measures shall be installed immediately after planting and/or seeding operations are completed. For all sloped areas to be seeded, erosion control shall be installed prior to or at the same time as seeding takes place.

PART 2 - MATERIALS

2.1 SILT FENCE

- A. Silt fence shall consist of a woven fabric comprised of high-tenacity polypropylene yarns and a plastic net backing, square hardwood posts, and connection hardware or aluminum wire. Fabric shall be 3 feet wide.
- B. Silt fence shall meet the following minimum requirements:

Fabric Property	Minimum Accepted Value	Test Method
Grab Tensile Strength (lb)	120	ASTM D 4632
Elongation at failure (%)	20% max.	ASTM D 5034 & D4632
Mullen Burst Strength (psi)	200	ASTM D 3786
Trap. Tear Strength (lb)	50	ASTM D 4533
Puncture Strength (lb)	40	ASTM D 6241 or D 4833
Equivalent Opening Size	30	US Std. Sieve CW-02215 ASTM D 6241 AOS-D 4751
Ultraviolet Radiation Stability (%)	80	ASTM ASTM D 4355
Life Span	6 months	-

- C. Support stakes shall be 2" x 2" x 5' min. hardwood.

2.2 COMPOST FILTER TUBES

- A. Compost filter tubes shall be made of 100% biodegradable materials and shall be knitted mesh with openings that allow for sufficient water flow and effective sediment capture.

- B. Compost filter tubes shall meet the following minimum requirements:

Fabric Property	Minimum Accepted Value
Material	HDPE, Cotton, Hemp, or Jute
Mesh Opening Size	approximately 3/8 inch
Diameter	12 inches
Tensile Strength	26 psi
Compost Media	Locally sourced
Life span	6 months

- C. Support stakes shall be 2" x 2" x 3' min. hardwood.
- D. Compost material shall be a well-decomposed humus material derived from the aerobic decomposition of biodegradable matter, free of viable weed seeds and other plant propagules (except airborne weed species), foreign debris such as glass, plastic, etc. and substances toxic to plants. Compost shall be suitable for use as a soil amendment and shall support the growth of ornamental nursery stock and turf establishment. Compost shall be in a shredded or granular form and free from hard lumps. Food and agriculture residues, animal manure, or other biosolids that meet the above requirements and are approved by the DEP are acceptable as source materials. The level of toxic elements and compounds in organic matter shall be below the DEP Type I standards for sludge and the EPA standards for Class A "Exceptional Quality Sludge", whichever is more stringent. Levels of pathogens shall be below both federal and state thresholds. Composted material with an unpleasant odor, such as that of ammonia or fecal material shall be rejected by the Engineer.
- E. Compost shall not include peat, manure or biosolids, kiln dried wood, or construction debris. All material shall pass through a 2-inch sieve.

2.3 JUTE MESH NETTING

- A. Jute mesh netting shall be undyed and unbleached 100% biodegradable material and contain no polypropylene.
- B. Jute mesh netting shall meet the following minimum requirements:

Fabric Property	Minimum Accepted Value
Open Area	70-75%
Mesh Size	approximately 1/2 inch
Roll Weight	between 0.9 and 1.2 pounds per linear yard
Warp Ends	78 per linear yard
Weft Ends	41 per linear yard
Recommended flow	6 fps (1.8 m/s)
Life span	9-12 months

- C. Anchoring devices shall be metal staples. Metal staples shall be a minimum of 0.09-inch diameter wire, or greater, with u-shaped legs at least 6 inches in length. Longer staples shall be used where loose and/or sandy soils are present or as required by the Engineer.

2.4 SILT SACKS

- A. Silt sacks shall be manufactured woven polypropylene geotextile sewn by a double needle thread using high strength nylon thread. Silt sacks shall be specially designed to fit existing and proposed catch basin and inlet sizes and held in place with sleeved rebar.

PART 3 - EXECUTION

3.1 GENERAL

- A. Prior to initial placement of barriers, the Contractor and the Engineer shall review locations specified on the plans and adjust placement to ensure that the placement will provide maximum effectiveness.
- B. Sediment controls shall be installed prior to disturbing upslope soil.
- C. Barriers shall be staked, trenched, and/or wedged as specified herein and according to the Manufacturer's instructions. Barriers shall be securely in contact with existing soil such that there is no flow beneath the barrier.

3.2 SILT FENCE INSTALLATION

- A. Silt fence shall only be used if shown on the plans or when specified by Orders of Condition or other permit requirements.
- B. Install fence posts no further than 8 ft apart along the line of the proposed fence. The top of the posts shall extend at least 2 ft above the normal water level. Posts shall be driven into the soil to a sufficient depth to form a stable support for the filter fabric. When used with compost filter tubes, the tube shall be placed on a minimum of 8 inches of folded fabric on the upslope side of the fence. Fabric does not need to be trenched.
- C. Attach the fabric to the posts on the upstream side. Attachment of the fabric to the posts can be made with prefabricated pockets in the fabric, staples or other suitable arrangements approved by the Engineer. The fabric shall extend 2 ft above the normal water level and at least 1 ft shall extend horizontally along the soil at the bottom. Excavate a 6-in. x 6-in. trench along the bottom upstream side of the fence, wrap the bottom of the fabric around the inside of the trench and then backfill the soil into the fabric pocket so as to anchor the fence fabric.
- D. Soil shall then be placed over the horizontal bottom layer of fabric to a depth of 6 in.
- E. Fabric may be spliced together along the vertical edge by overlapping the pieces by one post spacing or 6 ft whichever is greater and securing the layer together at intervals of 2 in.
- F. Should the required height exceed the roll width, a second roll shall be used. The width shall be overlapped a minimum of 1 ft and the layers shall be secured together at not more than 2-ft intervals along the midpoint of the overlap.
- G. Installation procedures may be varied to comply with manufacturer's recommended procedures with the approval of the Engineer. The contractor may submit alternate installation procedures for approval by the Engineer.
- H. When used with straw bales, an 8-inch deep and 4-inch-wide trench or V-trench shall be dug on the upslope side of the fence line. One foot of fabric shall be placed in the bottom of the trench

followed by backfilling with compacted earth or gravel. Stakes shall be on the down slope side of the trench and shall be spaced such that the fence remains vertical and effective.

- I. Width of fabric shall be sufficient to provide a 36-inch-high barrier after fabric is folded or trenched. Sagging fabric will require additional staking or other anchoring.

3.3 COMPOST FILTER TUBE INSTALLATION

- A. Installation shall be such as to ensure good contact with the existing ground. Compost filter tubes shall be tamped along existing ground but shall not be trenched.
- B. When reinforcement is necessary, tubes shall be stacked as shown on the detail or as directed by the ENGINEER.

3.4 JUTE MESH NETTING INSTALLATION

- A. Installation shall be such as to ensure continuous contact with soil without folds or wrinkles. Jute mesh netting shall be laid such that upslope fabric is placed over lower slope fabric by a minimum of 3 feet. Adjoining rolls (sides) shall be overlapped a minimum 6 inches. The netting shall extend beyond at least 1 foot beyond the edge of the seeded area.
- B. The Contractor shall bury the ends of the jute mesh netting 6-8 inches in anchor trenches at top and bottom of slopes.
- C. Jute mesh netting shall be anchored in place with vertically driven metal staples. The staples shall be driven in until their tops are flush with the soil. Staples shall be placed at 12-inch intervals along the top of a slope and in staggered courses along the face of the slope to achieve a minimum of 3 metal staples per square yard, or at manufacturer's recommendations for the given site conditions.
- D. Contractor shall reseed all trenched and otherwise disturbed areas with specified seed mix. The Contractor shall maintain the jute mesh netting and make satisfactory repairs of any areas damaged until acceptance of plantings and/or seed establishment.

3.5 SILT SACK INSTALLATION

- A. Installation shall be such as to ensure no surface drainage shall bypass the sack.
- B. Sacks shall be installed within the catch basin or inlets with covers installed over them to keep them in place.
- C. When the restraint cord within the Silt sack is no longer visible, the Silt sack should be emptied of sediment and reinstalled.

3.6 MAINTENANCE

- A. Maintenance of the sediment control barrier shall be per this Section or per the Stormwater Pollution Prevention Plan (SWPPP), whichever is more restrictive.
- B. The Contractor shall inspect the sediment barrier in accordance with relevant permits. At a minimum, barriers shall be inspected at least once every 7 calendar days and after a rain event resulting in 0.25 inches or more of rainfall. Accumulation of debris and/or silt shall be removed

and properly disposed of as necessary at no additional cost. In no case shall accumulations of more than 4 inches above the original ground line be permitted to remain.

- C. Contractor shall be responsible for ensuring that an effective barrier is in place and working effectively. If a breach or other failure of the sediment control occurs, the control shall be immediately restored.
- D. Barriers that decompose such that they no longer provide the function required shall be repaired or replaced as directed. If the resulting berm of compost within the fabric tube is sufficiently intact (despite fabric decay) and continues to provide effective water and sediment control, barrier does not necessarily require replacement.
- E. A regular maintenance schedule for cleaning the silt sacks shall be followed, including a review of all Silt Sacks after any rain event or extensive snow melt.

3.7 REMOVING EROSION AND SEDIMENTATION CONTROL

- A. Barriers shall be dismantled and/or removed, as required, when construction work is complete and upslope areas have been permanently stabilized and after receiving permission to do so from the Engineer.
- B. Regardless of site context, nonbiodegradable material and components of the sediment barriers, including photo-biodegradable fabric, plastic netting, nylon twine, and sedimentation fence, shall be removed and disposed off-site by the Contractor.
- C. For naturalized areas, biodegradable, natural fabric and material may be left in place to decompose on-site. In urban, residential, or other locations where aesthetics is a concern, the following shall apply:
- D. Compost filter tube fabric shall be cut and removed, and compost shall be raked to blend evenly (as would be done with a soil amendment or mulch). No more than a 2-inch depth shall be left on soil substrate.
- E. Silt fence, stakes, and other debris shall be removed and disposed off-site. Site shall be restored to a neat and clean condition.
- F. Remove all silt sacks once grades are stabilized.

END OF SECTION

SECTION 32 10 00

ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification prior to preparation and installation of any pavements.
 - 1. Massachusetts Department of Transportation, Highway Division, 2023 Standard Specifications for Highways and Bridges, including all addenda, (referred to as the Standard Specification).
 - 2. American Association of State Highway and Transportation Officials (AASHTO)
 - a. M323 – Standard Specification for Superpave Volumetric Mix Design
 - b. MP19 – Standard Specification for Performance-Graded Asphalt Binder Using Multiple Stress Creep Recovery (MSCR) Test
 - c. R35 – Standard Practice for Superpave Volumetric Design for Hot-Mix Asphalt (HMA)
 - d. T209 – Standard Method of Test for Theoretical Maximum Specific Gravity (Gmm) and Density of Hot Mix Asphalt (HMA)
- B. Section includes, without limitation, providing:
 - 1. Requirements for construction of all temporary and permanent pavements on paved areas for roadways, driveways, walkways, temporary and permanent trench patching and other areas, as indicated on the drawings and as herein specified.
- C. Extent: As shown, if not, as follows
 - 1. The Contractor's attention is directed to the various pavements required under this contract, and their locations as detailed below.
 - 2. Applicable to utility trenches and associated civil site work.
 - 3. Shall not be applicable to landscaping elements and associated work. Paving requirements applicable to landscaping elements shall be found in the landscaping specifications.
 - 4. All pavement thickness specified in this specification shall be of the thickness required after compaction.

Location: Bitumenous Concrete Paving at Walkways

Type: Flexible

Requirements: 8" Gravel Borrow Type B

1.75" Class 19.0 Hot Mix Asphalt Intermediate Course (SIC 19.0)

1.25" Class 9.5 Hot Mix Asphalt Surface Course (SSC 9,5)

D. Related sections, without limitation, include:

1. Section 31 20 00 - EARTH MOVING
2. Section 31 05 16 – AGGREGATES FOR EARTHWORK
3. Section 32 16 13 – CURBS AND GUTTERS

1.2 SUBMITTALS

A. In accordance with Section 01 33 00, SUBMITTAL PROCEDURES submit Job Mix Formula for each type of hot mix asphalt pavement used on the project.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Class 9.5 Hot Mix Asphalt and Class 12.5 Hot Mix Asphalt

1. Aggregate – Shall conform to the 3 to <10 million ESAL requirements of Table 5 in AASHTO M 323. No more than 10% of the aggregate shall be natural sand. All aggregate properties of Section M3.03.0 Asphalt Emulsions of the Standard Specifications shall apply.
2. The binder shall meet the requirements of PG 64-28, Grade S as specified in AASHTO M 320 and MP 19. The contractor may use an approved warm mix additive (WMA) at a dosage rate recommended by the manufacturer. Only chemical or organic WMAs may be used. Mechanical water injection will not be allowed. If a WMA is used it shall be provided at no additional cost to the State.
3. Mix Design – HMA mixes shall conform to AASHTO M 323, "Standard Specification for Superpave Volumetric Mix Design". The design procedure shall follow AASHTO R35 "Standard Practice for Superpave Volumetric Design for Hot-Mix Asphalt (HMA)". The design specifications found in AASHTO M 323 shall supersede those found in the Standard Specifications for Road and Bridge Construction. A mix design using PG64-28 Grade S shall be used to determine the design binder content. The voids in the mineral aggregate (VMA) and VMAeffective shall be calculated for each asphalt content during the mix design process. The following specific requirements and exceptions to AASHTO M323 shall apply.
 - a. Ninitial shall be 6, Ndesign shall be 50 and Nmax shall be 75 gyrations.
 - b. A moisture susceptibility test will not be required.
 - c. The mix shall be designed at 4% voids.
 - d. The VMA shall be greater than or equal to 16.5%.
 - e. The VFA shall be 70 to 80 percent.
 - f. The mix shall be coarse graded as defined in Section 6.1.3 of AASHTO M 323.

- g. The dust to binder ratio (P0.075/Pbe) shall be 0.5 – 1.0. The design effective binder content shall be used to calculate this ratio.
- h. No RAP will be allowed in the mix.
- i. In addition to the sieves listed in Table 3 of AASHTO M 323, the 0.600 mm, 0.300 mm and 0.150 mm sieves will be required. The 50.0 mm and 37.5 mm sieves will not be required.
- j. The following procedures shall be adhered to for the mix design:
 - 1) Three trial blends shall be submitted and accepted before beginning the mix design procedure.
 - 2) All trial mixture data and calculations determined for Section 9 of AASHTO R35 shall be submitted to the Engineer. The Engineer will determine which trial mixture shall be used for the mix design procedure.
 - 3) After the mix design is completed, it shall be submitted to the Engineer for acceptance.
 - 4) The correction factors for the ignition furnace in the plant lab shall be provided.
 - 5) The gyratory cores and Rice (AASHTO T 209) samples at the design binder content shall be submitted to the Engineer.
 - 6) A successful plant trial batch shall be performed before production of the HMA begins.

2.2 SOURCE QUALITY CONTROL

- A. The paving plant used by the Contractor for preparation of hot mix asphalt materials shall be acceptable to the Engineer who shall have the right to inspect the plant and the making of the material.
- B. Plant Laboratory – In addition to the requirements of Section 460 of the Standard Specifications, the contractor provided lab shall be equipped with the following:
 - 1. Gyratory compactor conforming to AASHTO T 312 and two molds.
 - 2. All equipment required to determine the theoretical maximum specific gravity in accordance with AASHTO T 209 Test Method A and Section 13.1. A metal pycnometer and electronic digital vacuum gauge shall also be provided.
 - 3. All sieves required for the mix design process.
 - 4. Facilities and equipment to perform a wet-wash in accordance with AASHTO T-30 and a faucet spray hose shall be provided.
- C. Mix Production – A random sample will be taken at the plant every 600 tons per production day. If the quantity of HMA needed to finish the day's production is projected to be less than 600 tons, a sample may be taken at the Engineer's discretion. The following mix production tolerances shall apply:
 - 1. The air voids (Va) shall be 3.0 – 5.0 percent.

2. The following tolerances for gradation shall apply:

Particle Size	% Passing
12.5mm	100%
9.5mm	90% - 100%
4.75mm	90% max
2.36mm	Established by the mix design $\pm 5\%$
0.075mm	Greater than or equal to 2.0%

3. The production binder content shall be $\pm 0.3\%$ from the optimum binder content established by the mix design.
4. In-place density shall be a minimum of 92.0% of the theoretical maximum density obtained at the plant.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prior to placing pavement, all backfill shall have been properly compacted as specified under SECTION 31 20 00 EARTH MOVING to eliminate settling of backfill. No pavement shall be placed over poorly compacted backfill. Backfill and gravel base course shall be compacted, brought to the proper elevation, and dressed so that new pavement construction shall be at the required grade. The Contractor shall maintain the surfaces of all excavated and disturbed areas until the pavement is placed. If there is a time lapse of more than 24 hours between completion of preparation of subgrade or placing of gravel base course and placing of paving, or if subgrade or gravel base course has been eroded or disturbed by traffic, the subgrade or gravel base course shall be restored before placing pavement.
- B. When installing permanent pavement on hot mix asphalt roadway the edges of existing pavement shall be cut back 12-inches, or more as required, from the trench excavation wall or damaged area to sound undamaged material, straightened, cleaned, and painted with an accepted asphalt emulsion to ensure a satisfactory bond between it and the newly placed surface courses. Existing surface courses shall be stripped from the hot mix asphalt base course for at least a 6-inch width and trimmed square and straight so that new permanent surfacing shall be placed on undisturbed hot mix asphalt base course. Existing pavement shall be swept clean prior to placing any asphalt emulsion over it. Existing pavement that will be under new pavement shall be painted with asphalt emulsion to ensure a satisfactory bond.
- C. Before permanent pavement is installed, the base shall be brought to the proper grade, and temporary pavement and excess gravel base shall be removed.
- D. All manhole covers, catch basin grates, valve and meter boxes, curbs, walks, walls, and fences shall be adequately protected and left in a clean condition. Where required, the grade of manhole covers, catch basin grates, valve boxes, and other similar items shall be adjusted to conform to the finished pavement grade.
- E. The Contractor shall remove and acceptably dispose of all surplus and unsuitable material.

3.2 INSTALLATION

A. General

1. All construction methods and materials shall be satisfactory to the Engineer.
2. Unless indicated otherwise, all permanent hot mix asphalt pavements shall be installed in one (1) course. Hot mix asphalt base courses shall be carefully spread and raked to a uniform surface and thoroughly rolled before application of the top course.
3. All top courses of permanent paving shall be applied with acceptable mechanical spreaders in widths of at least 9 feet.
4. The rolling for all hot mix asphalt and gravel borrow sub-base courses shall conform to the standards listed in the appropriate Subsection of the Standard Specification.
5. Pavement shall be placed so that the entire roadway or paved area shall have a true and uniform surface, and the pavement shall conform to the proper grade and cross section with a smooth transition to existing pavement.

B. Temporary Pavement

1. Temporary pavement shall be placed over all trenches in paved areas where directed by the Engineer.
2. The Contractor, upon completing the backfilling and compaction of the trenches in the streets and the placing of the gravel borrow sub-base course, shall be required to construct temporary pavement unless otherwise directed by the Engineer.
3. Temporary Pavement in roads shall be placed in one course and shall consist of 2-inch compacted thickness of Class 12.5 hot mix asphalt mix, on a 14-inch compacted thickness gravel base as directed by the Engineer.
4. The Contractor shall maintain temporary pavement in good repair and flush with the existing pavement at all times until the permanent pavement is placed.
5. The temporary pavement shall not be removed until such time that the Engineer authorizes the placement of permanent pavement.

C. Class 9.5 Hot Mix Asphalt

1. Class 9.5 Hot Mix Asphalt shall be used for surface course pavements in the locations as listed in Article 1.03 of this specification.
2. Class 9.5 Hot Mix Asphalt shall be placed to the thickness as indicated in Article 1.03 of this Specification and installed in accordance with the requirements of the Standard Specification and as detailed in the Contract Drawings.
3. Prior to placing Class 9.5 Hot Mix Asphalt, all temporary pavement and sufficient gravel base course shall be removed, to proper depths as detailed in the Contract Drawings.
4. Tack Coat Between Lifts:
 - a. Apply emulsified asphalt tack coat (meeting Section M3.11.03) to all existing pavement surfaces and between successive HMA lifts at the manufacturer's recommended rate. The surface shall be clean and dry before application. Place the

next lift only after the tack coat has cured to a tacky condition. Do not apply tack coat during rain or when temperatures are below 40 °F.

D. Class 12.5 Hot Mix Asphalt

1. Class 12.5 Hot Mix Asphalt shall be used for intermediate (binder) course pavements in the locations as listed in Article 1.03 of this specification.
2. Class 12.5 Hot Mix Asphalt shall be used for temporary pavement patching, as directed, including temporary trench patching in the locations shown on the plans and directed by the Engineer.
3. Class 12.5 Hot Mix Asphalt shall be placed to the thickness as indicated in Article 1.03 of this Specification and installed in accordance with the requirements of the Standard Specification and as detailed in the Contract Drawings.
4. Prior to placing Class 12.5 Hot Mix Asphalt, all temporary pavement and sufficient gravel base course shall be removed, to proper depths as detailed in the Contract Drawings.

E. Surface Maintenance

1. During the guarantee, period, the Contractor shall maintain the bituminous surface and shall promptly make good all defects such as cracks, depressions, and holes that may occur. At all times, the surfacing shall be kept in a safe and satisfactory condition for traffic. If defects occur in surfacing constructed by the Contractor, the Contractor shall remove all hot mix asphalt and base course as is necessary to properly correct the defect. After removing hot mix asphalt and base course, the Contractor shall correct the cause of the defect and replace the base course and hot mix asphalt in accordance with these specifications.

END OF SECTION

SECTION 32 12 45

PLAYGROUND SAFETY SURFACING – POURED IN PLACE

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. The General Documents, as listed on the Table of Contents, and applicable parts of Division 01, GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Contract Documents and all other Sections of the Specifications for requirements therein affecting the work of this Section.
- C. Coordinate work with that of all other trades affecting or affected by work of this Section. Coordinate with such trades to assure.

1.2 DESCRIPTION OF WORK

- A. The work of this section shall include all labor, tools, materials, and appurtenances necessary to provide the installation of Poured-in-Place (P.I.P.) Permeable Polyurethane Safety Surfacing, within the Contract Limit Line as required by the drawings, as specified herein or as directed by the Engineer.

1.3 RELATED WORK UNDER OTHER SECTIONS

- A. The following items of related work are specified and included in other Sections of the Specifications:
 - 1. Section 31 20 00, EARTH MOVING
 - 2. Section 11 68 13, PLAYGROUND EQUIPMENT

1.4 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00, SUBMITTALS
- B. Provide manufactures literature, data, catalog cut(s) for the safety surfacing.
- C. Provide Installer Certification.
- D. Color and Color Mix samples for each of the color mixes (12" x 12" squares, pre-mixed and adhered with submitted binder).
- E. Manufacturer's Certificate of Compliance for materials and testing for the following:

Requirement	ASTM Testing
Impact Attenuation	ASTM F 1292
Tensile Strength	ASTM D 412
Tear Strength	ASTM D 624
Coefficient of Friction	ASTM C 1028, D 2047

Skid Resistance	ASTM E 303
Flammability	ASTM D 2895
Water Permeability	ASTM F 1551

- F. Testing data showing material conforms to quality assurance shall be supplied after installation and prior to payment. Tests shall be supplied by an independent testing agency and be conducted as per ASTM F 1292.
- G. Edge Restraint product literature.

1.5 QUALITY ASSURANCE

- A. Supplier must certify that polyurethane safety surface depth provided meets US Consumer Product Safety Commission's Technical Guidelines for playground surfacing as follows:
- B. "RECOMMENDATIONS - when tested in accordance with suggested test method in ASTM F355 Procedure C: A surface should not impact a peak acceleration in excess of 200 G's to an instrumented ANSI head-form dropped on a surface from the maximum fall height as delineated in the standard specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment Designated F1292-91."
- C. The surface shall meet the Head Injury Criteria (HIC) of less than 1000.
- D. Supplier must provide copies of testing procedures and results performed by independent testing source (s) which demonstrates compliance with C.P.S.C. Guidelines as described in item 1 under "Special Requirements."
- E. Supplier must provide complete installation instructions.
- F. A certificate of insurance must be provided by the supplier which shall provide coverage for products liability with the limit of liability not less than \$1,000,000.
- G. Provide proof that the installer is International Play Equipment Manufacturers Association (IPEMA) certified.
- H. Material shall only be installed when temperature is within the manufacturers acceptable range (generally higher than 50 degrees and lower than 90 degrees). Conform to manufacturer's recommendation for placement.
- I. Provide warranty for review.

1.6 PROJECT CONDITIONS

- A. Proceed with installation only when existing and forecasted weather conditions permit playground surface system installation to be performed according to manufacturers' written instructions and warranty requirements.

1.7 WARRANTY

- A. Shall be guaranteed against failure or defect for workmanship and fall height not to exceed HIC 1,000 and GMAX not to exceed 200, during normal use and operation for a period of five (5) years.
- B. Any defective elements or areas shall be replaced in part or whole by the Contractor at no cost to the Owner.

- C. The Contractor and the manufacturer shall hold the Owner and Engineer harmless from any damages or liability resulting from negligent acts or omissions on the part of the Contractor or manufacturer or improperly installed material.

1.8 CERTIFICATION

- A. Following completion of the installation of playground equipment and polyurethane surfacing, the Contractor shall prepare a certification letter to the Owner that states that the equipment has the required safety zone areas for all playground equipment as confirmed by a Certified Playground Safety Inspector (CPSI). Final payment will not be made without receipt of this certification.

PART 2 - MATERIALS

2.1 POLYURETHANE SAFETY SURFACING

- A. Shall be a poured-in-place, resilient, seamless rubber surface designed to impart impact attenuation when installed over a specified substrate and tested for non-slip characteristics under ASTM E-303 over the specified base.
- B. Material and depth of surfacing shall meet or exceed current Consumer Product Safety Commission (CPSC) guidelines issued in 'A Handbook for Public Playground Safety (latest edition)' for a minimum fall height of 7 feet, current Americans with Disabilities Act Guidelines (ADAG), and current American Society for Testing and Materials (ASTM) F-1292-91 requirements.
- C. Material shall be porous so as to allow water to percolate at the minimum rate of 10 GPM per square foot.
- D. Polyurethane safety surfacing shall pass flammability resistance tested in accordance with ASTM D2859-76 and BS-5696.

2.2 MATERIALS:

- A. Cushion Course - shall be a monolithic poured-in-place cushioned pad, made from a field-mix blend of recycled styrene butyrene rubber (SBR) ground into 3/8" shredded strands and a polyurethane binder. Depth of cushion course within each piece of play equipment and associated fall zone shall be coordinated with the manufacturer's requirements.
- B. Top Wearing Course - shall be a monolithic 1/2" poured-in-place top surface made from a blend of ethylene propylene diene monomer (EPDM) colored rubber particle measuring 1 to 3 mm and an ALIPHATIC binder.
- C. Binder – Binder shall be aliphatic urethane binder. Aromatic binders will not be accepted. Binders utilizing latex or emulsion type binder will not be accepted. Prefabricated shock pads will also not be considered equal. Binder shall weigh at least 8.9 lbs/gallon.
- D. Colors shall be Light Blue, Medium Blue and Lime Green. Colors shall be 80% Color/ 20% Black. Final colors for the top wearing course shall be selected by the Owner from the manufacturer's range of standard colors during the Shop Drawing Process. Layout poured in place shall be in a design to be provided by the Owner or Engineer during the Shop Drawing Process.
- E. Acceptable Manufacturers/Products:

1. Pro-Techs Surfacing
Sharon Center, OH 44274
Phone: (330) 576-6058
Website: www.pro-techsurfacing.com
2. Surface America (an ECORE Company)
Cheektowaga, NY, 14225
Phone: (800) 999-0555
Website: www.surfaceamerica.com
3. Sports Surface Specialties (a Playcore Company)
East Aurora, NY 14052
Phone: (716) 652-2039
Website: www.sportsurface.net

2.3 CRUSHED STONE

- A. Crushed stone shall be $\frac{3}{4}$ inch as specified in Section 31 05 16, AGGREGATES FOR EARTHWORK.

2.4 GEOTEXTILE FABRIC

- A. Geotextile fabric shall be as specified in Section 31 05 19.13 GEOTEXTILES FOR EARTHWORK.

2.5 4" PERFORATED PIPE

- A. Polyvinyl chloride (PVC) pipe-perforated: conform to ASTM F-758 and D-1784.

2.6 HEAVY DUTY L-SHAPED PROFILE MAINTENANCE STRIP EDGING:

- A. Permaloc PermaStrip, 1/8" (3.2mm) x 4" (152.46mm) high, extruded aluminum, 6063 alloy, maintenance strip edging Provide sliding connectors and 12" stakes. Finish: Milled Aluminum

PART 3 - EXECUTION

3.1 GEOTEXTILE FABRIC

- A. Install Geotextile Fabric according to manufacturer's recommendations. Install to surround the compacted gravel (bottom, sides and top) under the polyurethane safety surfacing.

3.2 CRUSHED STONE

- A. Crushed stone shall be installed and compacted per Section 31 05 16, AGGREGATES FOR EARTHWORK.
- B. Crushed stone shall have a smooth and level plane prior to pouring the polyurethane.

3.3 PIP POLYURETHANE SAFETY SURFACING

- A. Contractor shall coordinate the delivery and installation of the safety surfacing. Safety surfacing shall be installed immediately following the installation of the play equipment and curing of concrete footings.
- B. Installation shall be as recommended by the manufacturer and shall be to the depths and widths indicated on the drawings. Note that depth of wearing course is increased at impact areas noted on the drawings.
- C. Installation of PIP Edge between various adjacent surfaces include cement concrete walk, stabilized aggregate paving, engineered wood fiber and plantings. Contractor shall follow manufacturer's details for loose, tapered, and flush conditions.
- D. Binder to rubber percentage shall be as follows:
 - 1. Wearing Course: 20% min.
 - 2. Base Course: 18% min.
- E. Consult with manufacturer for limitations caused by weather and temperature.
- F. For poured polyurethane surfacing, the Contractor is responsible for overnight security during the period of curing; no foot traffic shall be permitted until the surface has fully cured (allowing for variations in weather and temperature).

3.4 FIELD QUALITY CONTROL

- A. Perform impact attenuation testing according to ASTM F1292 in presence of Owner's representative within 30 days of installation.
 - 1. Confirm Impact Attenuation Performance of Poured-in-Place rubber as follows:
 - a. G-max Score: Less than 200
 - b. Head Injury Criteria (HIC) Score: Less than 1,000.
 - 2. Test Equipment Operator Qualifications
 - a. National Recreation and Parks Association/National Playground Safety Institute (NRPA/NPSI) Certified Playground Safety Inspector (CPSI).
 - b. Trained in the proper operation of Triax impact test equipment by competent agency.
 - c. Tester/Test Agency and Test Equipment Operator shall be independent of Contractor.
 - d. Determine compliance with ASTM F 1292, unless otherwise specified in this Section.

3.5 ACCEPTANCE STANDARDS FOR PIP POLYURETHANE SAFETY SURFACING

- A. Polyurethane Safety Surfacing will be rejected by the Owner's Representative for the following reasons and as determined by the Owner's Representative:
 - 1. Upon installation horizontal or vertical curves do not meet the shapes and profiles shown on the Drawings. Curves that have broken backs, sags, saddles, tangents, or kinks will be rejected.
 - 2. Grade of safety surfacing does not comply with ADA or AAB or the Contract Documents.

3. Finish is inconsistent in material, texture, and/or color.

END OF SECTION

SECTION 32 16 13

CONCRETE CURB

PART 1 - GENERAL

1.1 SUMMARY

- A. Related documents:
 - 1. Massachusetts Department of Transportation, Highway Division, 2023 Standard Specifications for Highways and Bridges, including all addenda, (referred to as the Standard Specification).
- B. Section includes, without limitation, providing:
 - 1. The work to be done under this Section consists of furnishing all materials, labor, tools and equipment, and performing all operations necessary for the installation of all new curbs as shown on the Drawings or as directed by the Engineer and as herein specified.
- C. Extent: As shown.
- D. Submittals
 - 1. Submit Shop Drawings in accordance with SECTION 01 33 00, SUBMITTAL Procedures for the following:
 - a. Concrete Curb
 - 1) Fabricator's data sheets.
- E. Related sections, without limitation, include:
 - 1. Section 03 30 00 CAST IN PLACE CONCRETE
 - 2. Section 31 20 00, EARTH MOVING
 - 3. Section 32 10 00, ASPHALT PAVING

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Concrete Curb
 - 1. Concrete curb shall be per the sizes as shown on the plans conforming to the requirements of the MassDOT Standard Specification

PART 3 - EXECUTION

3.1 GENERAL

- A. Curbing

1. Curbing to be installed to the lines and grades shown on the plans and as directed by the Engineer.
2. All spaces under the curb, shall be filled and thoroughly compacted so that the curb will be completely supported throughout its entire length.

END OF SECTION

SECTION 32 17 23

PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. The General Documents, as listed on the Table of Contents, and applicable parts of Division 01, GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Contract Documents and all other Sections of the Specifications for requirements therein affecting the work of this Section.
- C. Coordinate work with that of all other trades affecting or affected by work of this Section.

1.2 DESCRIPTION OF WORK

- A. The work of this Section consists of:
 - 1. Textured Acrylic Surfacing for play markings.
 - 2. Contractor shall coordinate work between all Contractors, sections, and trades required for the proper completion of the work.
 - 3. Contractor is responsible for all health and safety.

1.3 RELATED WORK UNDER OTHER SECTIONS

- A. The following items of related work are specified and included in other Sections of the Specifications:
 - 1. Section 32 10 00, ASPHALT PAVING

1.4 REFERENCES

- A. Reference herein to any technical society, organization, group or regulation are made in accordance with the following abbreviations and, unless otherwise noted or specified, all work under this Section shall conform to the latest edition as applicable.
- B. Code of Federal Regulations (CFR).
- C. 29 CFR 1926, Safety and Health Regulations for Construction.
- D. American Concrete Institute (ACI).
- E. United States Tennis Association (USTA).
- F. International Tennis Federation (ITF).
- G. American Sports Builders Association (ASBA).
- H. American Society for Testing and Materials (ASTM)
- I. Related Section 32 12 16 ASPHALT PAVING.

1.5 DEFINITIONS

- A. Manufacturer specifications for components, color chart and installation instructions.
- B. ASBA: American Sports Builders Association
- C. USTA: United States Tennis Association
- D. MSDA: Material Safety Data Sheet
- E. IFT: International Tennis Federation

1.6 SUBMITTALS

- A. Manufacturer specifications for components, color chart and installation instructions.
- B. Authorized Applicator certificate from the surface system manufacturer.
- C. ITF classification certificate for the system to be installed.
- D. Reference list from the installer of at least 10 projects of similar scope done in the past 3 years.
- E. The installation contractor must be able to supply the Owner, upon request, a list of 10 projects surfaced with the specified materials over the last five (5) years and that have required no maintenance.
- F. Current Material Safety Data Sheets (MSDS).
- G. Certificate of acceptance of the concrete court base by the surfacing installer prior to installation of the surface.
- H. Product substitution: If other than the product specified, the contractor shall submit at least 7 days prior to the bid date a complete type written list of proposed substitutions with sufficient data, drawings, samples and literature to demonstrate to the owner's satisfaction that the proposed substitution is of equal quality and utility to that originally specified. Information must include a QUV test of at least 1000 hours illustrating the UV stability of the system. Test method similar to ASTM G53. The color system shall have an ITF pace rating in Category 2. Under no circumstances will systems from multiple manufacturers be considered.

1.7 COORDINATION

- A. Contractor shall coordinate with all other trades, especially Site Contractors to ensure approval of asphalt base prior to surfacing application. Any rework shall be done at no cost to the Owner.

1.8 QUALITY ASSURANCE

- A. Surfacing shall conform to the guidelines of the ASBA and USTA for planarity, or the design plans, whichever is more stringent shall govern.
- B. The contractor shall provide the inspector, upon request, an estimate of the volume of each product to be used on the site.
- C. The installer shall be an authorized applicator of the specified system.
- D. The manufacturer's representative shall be available to help resolve material questions.
- E. Local sands are not acceptable in the color playing surface. Sands must be incorporated at the manufacturing location to insure quality and stability.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store materials in accordance with manufacturer specifications and MSDS. Deliver product to the site in original unopened containers with proper labels attached. All surfacing materials shall be non-flammable.

1.10 WARRANTY

- A. The Contractor shall be required to guarantee all labor, materials, workmanship and services for the acrylic surfacing.
- B. Provide the manufacturer's standard warranty.
- C. The Contractor shall be required to submit the following documents in regard to the guarantee:
 - 1. Letter from the manufacturer(s) of all materials attesting to the guarantee length and limits. This must be signed by an officer of the organization.
 - 2. Maintenance Instruction Guide for the Contract Surfaces, signed by an officer of the surface company.
 - 3. Letter of Guarantee from the Installation Contractor for the above time period, signed by an officer of the Company.
 - 4. These documents shall be submitted to the Owner prior to final payment. The installer and the materials manufacturer shall supply a warranty covering labor and materials respectively. The warranty period shall be for five (5) years.

1.11 INSTALLER QUALIFICATIONS

- A. Installer shall be regularly engaged in construction and surfacing of acrylic tennis courts, play courts or similar surfaces.
- B. Installer shall be an Authorized Applicator of the specified surface system.
- C. Have completed 10 projects of similar scope done in the past 3 years using the same materials.
- D. Have completed 10 projects surfaced with the specified materials over the last five (5) years and that have required no maintenance.

1.12 MANUFACTURER QUALIFICATIONS

- A. System manufacturer shall provide documentation that the surface to be installed has been classified by the ITF as a medium pace surface.
- B. System manufacturer shall provide documentation that the surface to be installed is correct for its intended product use.

PART 2 - PRODUCTS

2.1 ASPHALT CONSTRUCTION

- A. BITUMINOUS CONCRETE BASE COURSE
 - a. See Section 32 10 00 for Binder and Top/ Finish Courses.

2.2 SURFACING SYSTEM MANUFACTURERS

- A. California Products Corp., Andover, MA. 01810 / Plexipave System www.plexipave.com.
- B. Benyon BSS Tennis, Tualatin, OR, www.benyonsports.com.
- C. NOVACRYLIC, Nova Sports, Framingham, MA, www.novasports.com

2.3 SURFACING SYSTEM MATERIALS

- A. Surfacing System shall be appropriate in type and materials for applications to Asphalt base materials. Asphalt base material shall meet the minimum curing times recommended by the manufacturer prior to placement of surfacing.
- B. Manufacturers surfacing SYSTEM shall be approved for each type of substrate material used. Use of approved manufacturers recommended surfacing SYSTEM shall be followed at all times. Use of products from other manufacturers or SYSTEMS is prohibited
- C. Colors: Colors shall be per the drawings and shall be from manufacturers standard palette, subject to owner approval.
- D. Patching Mix, Court Patch Binder - for use in patching cracks, holes, depressions and other surface imperfections.
- E. Crack Overlay and Repair System – A long term repair system that uses micro sealant technology to water-proof existing cracks with an overlay system, when installed, it creates an invisible repair which is not affected by weather or temperature as provided by RiteWay Crack Repair, 4 Sycamore Way, Unit 7A, Branford, CT, website www.ritewaytennis.com, or approved equal.
- F. Crack Filler - for use in filling fine cracks.
- G. Concrete Preparer is a specially formulated acid heat for use in neutralizing the concrete in preparation for the Acrylic Surfacing System.
- H. Adhesion Primer – is a two component water based epoxy primer for uncoated concrete surfaces.
- I. Acrylic Filler Course – for use as a filler for new or existing concrete surfaces. The 100% acrylic filler shall be blended with approved silica sand at the job site.
- J. Acrylic Color Playing Surface– for use as the finish color and texture. A two part system blended to achieve the correct surface texture.
- K. Line Paint – for use as the line marking on the court/play surface.
- L. Water – for use in dilution/mixing shall be clean and potable.

2.4 MATERIAL SPECIFICATIONS

- A. Court Patch Binder – 100% acrylic resin blended with Portland Cement and silica sand.
 - 1. Percent solids by weight (minimum) 46%
 - 2. Weight 8.7-8.9 lbs./gallon
- B. Concrete Preparer – Phosphoric Acid based surface treatment
 - 1. Percent solids by weight (minimum) 25.5%
 - 2. Weight 9.5-9.6 lbs./gallon
- C. Component Epoxy Primer

1. Percent solids by weight (minimum) 34.6-34.8%
 2. Weight 8.55-8.70 lbs./gallon
- D. Acrylic Resurfacer – 100% acrylic resin (no vinyl copolymerization constituent). The product shall contain not less than 3.5% attapulgite.
1. Percent solids by weight (minimum) 26.7%
 2. Weight 8.7-8.9 lbs./gallon
- E. 100% Acrylic Resin (no vinyl copolymerization constituent) with selected light fast pigments. Green shall contain not less than 8% chrome oxide.
1. Percent solids by weight (minimum) 36.5%
 2. Weight 10.0-10.2 lbs./gallon
- F. Color Base – 100% acrylic resin containing no vinyl copolymerization constituent. Contains not more than 63% rounded silica sand.
1. Percent solids by weight (minimum) 74%
 2. Weight 13.1-14.1 lbs./gallon
- G. Line Paint – 100% acrylic resin containing no alkyds or vinyl constituents. Texturing shall be rounded silica sand.
1. Percent solids by weight (minimum) 60.5%
 2. Weight 12-12.3 lbs./gallon
- H. All surfacing materials shall be non-flammable and have a VOC content of not less than 100g./ltr. Measured by EPA method 24.
- I. Local sands are generally not acceptable in the color playing surface. Sands must be incorporated at the manufacturing location to insure quality and stability. Sand used shall be dry silica sand of mesh as recommended by manufacturer for intended use.
- J. Asphalt or tar in any form will not be permitted in any coating.
- K. All material shall be delivered to the site in sealed containers with manufacturers label affixed.

PART 3 - EXECUTION

3.1 GENERAL

- A. Verify site conditions before proceeding with demolition work. Field check the accuracy of the Drawings and inspect structures, utilities, and other site features prior to start of work and notify Engineer in writing, of any hazardous conditions and/or discrepancies.
- B. Ensure that the concrete or asphalt has been allowed to cure at least 28 days prior to commencing work under this section.

- C. Concrete flat work shall be accepted by the surfacing installer, in writing, prior to applying surfacing.

3.2 WEATHER LIMITATIONS

- A. Court surfacing shall not be applied until asphalt surface course has cured for a minimum of 20 days.
- B. Do not install when rainfall is imminent or extremely high humidity prevents drying.
- C. Do not apply unless surface and air temperature are 50°F and rising.
- D. Do not apply if surface temperature is in excess of 140°F.

3.3 PREPARATION

- A. Clean surfaces of loose dirt, oil, grease, leaves, and other debris in strict accordance with manufacturer's directions. Pressure washing will be necessary to adequately clean areas to be coated. Any areas previously showing algae growth shall be treated with Clorox or approved product to kill the organisms and then be properly rinsed. The entire surface shall receive a thorough washing using muriatic acid.
 - 1. The acid shall be a 20% base solution before adding water.
 - 2. The dilution factor of the muriatic acid shall be 50% water to a 20% solution acid.
 - 3. The acid shall be applied and let stand for 4 hours before washing.
 - 4. The surface shall be thoroughly washed using clean water to remove the residue.
- B. Holes, cracks and saw cuts: Cracks and holes shall be cleaned and a suitable soil sterilant, as approved by the Engineer, shall be applied to kill all vegetation 14 days prior to use of Court Patch Binder according to manufacturer's specifications.
- C. Depressions: Depressions holding enough water to cover a five cent piece shall be filled with Court Patch Binder Patching Mix. 3 gallons of Court Patch Binder, 100 lbs. 60-80 silica sand, 1 gallon Dry Portland Cement (Type I).
 - 1. This step shall be accomplished prior to the squeegee application of Acrylic Resurfacer. The contractor shall flood all the courts and then allow draining. Define and mark all areas holding enough water to cover a nickel. After defined areas are dry, prime with tack coat mixture of 2 parts water/1 part Court Patch Binder. Allow tack coat to dry completely. Spread Court Patch Binder mix true to grade using a straight edge (never a squeegee) for strike off. Steel trowel or wood float the patch so that the texture matches the surrounding area. Never add water to mix. Light misting on surface and edges to feather in is allowed as needed to maintain work ability. Allow to dry thoroughly and cure.
- D. Concrete Acid Treatment: Concrete Preparer shall be applied to all uncoated concrete surfaces at the rate of .01 to .012 gallon per square yard. Dilute 1 gallon of Concrete Preparer with 4 gallons of potable water. Apply liberally to the surface and spread with a soft hair push broom. After the surface has dried remove any dust or latent material.
- E. The surface to be coated as specified shall be inspected and made sure to be free of grease, oil and other foreign matter before starting the work. The Contractor shall remove by broom, vacuum, blower or power washer all dust, dirt, imbedded soil, etc., as necessary to provide a clean surface to receive the color system.

- F. Care shall be taken to protect adjacent areas and structures (fences, posts, sidewalks, buildings, etc.) which are not to be coated. In the event that coatings are applied to above, remove immediately before drying occurs.
- G. Primer shall be applied to all uncoated concrete surfaces prior to application of filler materials. Apply at an application rate of .025-.03 gallon per square yard. Primer used shall be compatible with base surface (asphalt or Concrete)
 - 1. Mix component A with Component B at a ratio of 1:1. Let stand for 20-30 minutes prior to use.
 - 2. Apply with a short nap phenolic core roller.
 - 3. Allow the 2 part epoxy primer to dry for approximately 1-3 hours until the surface is slightly tacky to the touch. In no case shall the surface be left overnight before receiving an application of Acrylic Resurfacer.
- H. Filler Course. (Acrylic Resurfacer): On the properly applied primer the filler course shall be applied to the clean underlying surface in one application to obtain a total quantity of not less than .06 gallon per square yard based on the material prior to any dilution. Acrylic Resurfacer may be used to pre-coat depression and crack/hole repairs to achieve better planarity prior to filler course application. The in depth filler coat coloring shall match the color combination for the finished surface.
 - 1. Over a properly repaired surface of concrete on existing courts, apply two coats of the filler course according to the following mix:
 - a. Acrylic Resurfacer 55 gallons
 - b. Water 20-40 gallons
 - c. Sand 600-800 lbs./60-80 mesh
 - d. Liquid Yield 112-138 gallons
 - 2. On new asphalt, a minimum of two coats of Acrylic Resurfacer may be used to properly fill all voids in the asphalt surface. Use clean, dry 50-60 mesh sand and clean, potable water to make mixes. The quantity of sand and water in the above mix may be adjusted within above limits to complement the roughness and temperature of the surface.
 - 3. The quantity of water used in diluting these coatings may exceed the quantity specified by the manufacturer only by a small amount and only if too rapid drying is occurring because of weather conditions. Permission of the Owner shall be obtained before adding any additional water.
 - 4. Mix the ingredients thoroughly using accepted mixing devices and use a 70 Durometer rubber bladed squeegee to apply each coat of Acrylic Resurfacer as required.
 - 5. Allow the application of Acrylic Resurfacer to dry thoroughly. Scrape off all ridges and rough spots prior to any subsequent application of Acrylic Resurfacer or subsequent cushion or color surface system.

3.4 APPLICATION

- A. All areas to be color coated shall be clean, free from sand, clay, grease, dust, salt or other foreign matters. The Contractor shall obtain the Engineer's approval, prior to applying any surface treatment.

- B. Blend color base and acrylic resin with a mechanical mixer to achieve a uniform mixture. The mix shall be:
 - 1. Color Base: 30 Gallons
 - 2. Acrylic Resin: 20 Gallons
 - 3. Water: 20 Gallons
- C. Application shall be made by 50 durometer rubber faced squeegees. The uniform mixture should be poured on to the court surface and spread to a uniform thickness in a regular pattern.
- D. A total of 3 applications of the uniform mixture shall be made to achieve a total application rate of not less than .15 gal./sy. No application should be made until the previous application is thoroughly dry.
 - 1. The color system shall be applied in a two color combination with the colors to be selected from the manufacturers standard palette at the time of submittal review.

3.5 LINE PAINTING

- A. Upon completion and acceptance of the tennis court surface, the Contractor shall prepare and paint lines as needed.
- B. Line shall be 2" wide unless otherwise noted on the drawings. Lines shall be carefully laid out in accordance with ASBA and USTA guidelines. The area to be marked shall be taped on both sides to insure a crisp line. All areas that have overlapped color shall be corrected.
- C. The Line Paint shall have a texture similar to the surrounding play surface. Application shall be made by hand with a brush or roller at the rate of 150-200 sg./gal. (3/4 gal. per tennis court).
- D. Each measurement shall be accurately set to within 1/8" tolerance in accordance with the USTA specification.
- E. Court shall be marked as shown on plan.

3.6 CLEANING

- A. Remove all containers, surplus materials and debris. Dispose of materials in accordance with local, state and Federal regulations.

3.7 PROTECTION

- A. Erect temporary barriers to protect coatings during drying and curing.
- B. Lock gates to prevent use until acceptance by the owner's representative.

3.8 CLEAN UP

- A. Contractor shall remove all debris, residuals, and materials at the conclusion of the work.

END OF SECTION

SECTION 32 31 13
CHAIN LINK FENCE AND GATES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. The General Documents, as listed on the Table of Contents, and applicable parts of Division 01, GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Contract Documents and all other Sections of the Specifications for requirements therein affecting the work of this Section.
- C. Coordinate work with that of all other trades affecting or affected by work of this Section.

1.2 DESCRIPTION OF WORK

- A. The work of this section shall include all labor, tools, materials, and appurtenances necessary to provide and install fencing and gates as shown on the plans and as described below.

1.3 RELATED WORK UNDER OTHER SECTIONS

- A. The following items of related work are specified and included in other Sections of the Specifications:
 - 1. Section 03 30 00, CAST-IN-PLACE CONCRETE

1.4 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00, SUBMITTALS
- B. Provide manufacturer's literature, data, catalog cut(s) for the selected fence and gates as well as material and color sample to the Designer's for approval.
- C. Contractor shall submit a fence layout plan showing location, post spacing and panel sizes, gate locations and installation in concrete footings.

1.5 REFERENCES

- A. Fed. Spec. RR-F-191/1A, Type V, for Fencing, Wire and Post, Metal (Chain-link Fence Fabric).
- B. Note to specifier: Edit the following ASTM specifications to include only applicable specifications.
 - 1. American Society for Testing and Materials
 - 2. A121, Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.
 - 3. A392, Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
 - 4. A491, Specification for Aluminum-Coated Steel Chain Link Fence Fabric.
 - 5. A824, Specification for Metallic-Coated Steel Marcellled Tension Wire for Use with Chain Link Fence.

6. F 626, Specification for Fencing Fittings
7. F668, Standard Specification for Poly (Vinyl Chloride) (PVC)-Coated Steel Chain Link Fence Fabric.
8. F669, Standard Specification for Strength Requirements of Metal Posts and Rails for Industrial Chain Link Fence.
9. F900, Standard Specification for Industrial and Commercial Swing Gates.
10. F934, Standard Specification for Standard Colors for Polymer Coated Chain Link Fence Materials.
11. F1043, Specification for Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework
12. F1083, Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
13. F1183, Specification for Aluminum Alloy Chain Link Fence Fabric.
14. F1184, Specification for Industrial and Commercial Horizontal Slide Gates.
15. F1234, Protective Coatings on Steel Framework for Fences.
16. F1664, Specification for Poly (Vinyl Chloride) (PVC)-Coated Steel Tension Wire Used with Chain Link Fence.
17. F1665, Specification for Poly (Vinyl Chloride) (PVC)-Coated Steel Barbed Wire Used with Chain Link Fence

1.6 WARRANTY

- A. Provide manufacturer's standard limited warranty that steel posts are free from defects in material and workmanship for a period of 15 years from the date of purchase.

PART 2 - MATERIALS

2.1 GENERAL

- A. The fence shall be of the height indicated and shall have a top rail and bottom tension wire.
- B. Fence materials and installation shall meet or exceed the standards of the Chain Link Fence Manufacturers Institute, Columbia, MD., except as otherwise specified in this section; also fence materials shall meet or exceed Fed. Spec. RR-F-191G/GEN for Fencing, Wire and Post Metal (and Gates, Chain-link Fence Fabric, and Accessories), and shall conform to the ASTM Standards noted in this Specification.
- C. Match style, finish, and color of each fence component with that of other fence components.
- D. All fittings, post, fence and gate framework, and all accessories shall be galvanized steel <OR> All fittings, post, fence and gate framework, and all accessories shall be galvanized steel, then coated with PVC.

2.2 CHAIN LINK FABRIC

- A. Fabric shall be woven in 2-inch mesh from [B: 9 gauge wire, (standard industrial)]. Diamond count shall be manufacturer's standard.
- B. Zinc-Coated Steel in accordance with ASTM A392, [A: Class 1 (weight of zinc coating not less than 1.2 oz/sf); galvanized after weaving.]
- C. Polyvinylchloride coated (PVC) chain-link fabric in accordance with ASTM F668,

1. [A: Class 1 PVC coating extruded onto wire that is zinc coated.]
- D. Aluminum coated fabric conforming to ASTM A491.
- E. Aluminum Alloy fabric conforming to ASTM F1183.
- F. Fabric height specified below is the height of the overall dimension of the fabric from ends of the twists or knuckles. Fabric heights are generally available in 36, 42, 48, 60, 72, 84, 96, 108, 120 and 144 inches.
- G. Fabric Height: [A: 48] inches unless otherwise shown.
- H. Selvages: Fabric with 2 inch or 2 1/8 inch mesh; in heights less than 72-inches high, both selvages to be knuckled. For fences with fabric 72-inches high and greater, one selva ge to be knuckled and one selva ge to be twisted.
- I. Color of the PVC coating: Black, and shall match the color of the total fence system.

2.3 FENCE POSTS, RAILS, AND BRACES

- A. General
 1. In accordance with ASTM F669, Heavy Industrial Fence.
 2. Protective Coatings: Zinc Coating; ASTM F1234, Type A external and internal coating.
 3. [A: Color coating: ASTM F934, minimum 10 mils thickness of PVC over zinc coating to match color of chain link fabric.]
- B. Steel posts for fabric heights up to 6 feet:
 1. Round Line or Intermediate Posts: 2.375 inch OD Type II steel pipe.
 2. Round End, Corner, and Pull Posts: 2.875 inch OD Type II steel pipe.
- C. Steel posts for fabric heights over 6 feet:
 1. Round Line or Intermediate Posts: 2.875 inch OD Type II steel pipe.
 2. Round End, Corner, and Pull Posts: 4.00 inch OD Type II steel pipe.
- D. Softball and Baseball Backstop Posts
 1. 4.000 inch outside diameter steel pipe weighing not less than 6.56 lb. per ft.
- E. Top and bottom railings and railings for top, middle and bottom braces between terminal posts and adjacent line posts.
 1. 1 5/8 inch outside diameter steel pipe weighing not less than 2.26 lb. per ft.
- F. Bottom rails for all fences. Middle rails on all fences 8'-0" height or taller.
- G. Backstop rails for baseball shall be placed at bottom, 18", 5'-0", 10'-0", 20'-0" and 30'-0".
- H. Backstop rails for softball shall be placed at bottom, 7'-6", 15'-0" and 25'-0".

2.4 TENSION WIRE

- A. No. 7-gauge, marcelled, coated steel wire conforming to ASTM A824 [A: Type I, Aluminum coated, 0.40 oz/sf] Finish to match fabric.

2.5 TIE WIRES

- A. Wire for fastening fence fabric to line posts and rails.
 - 1. 0.106 inch diameter (12 gauge) galvanized steel with a minimum of 0.80 oz. per sq. ft. of zinc coating according to ASTM A641, Class 3 or
 - 2. 0.148 inch diameter (9 gauge) aluminum wire alloy 1350-H19 or equal, to match fabric wire.
 - 3. Finish to match fabric.

2.6 STRETCHER BARS

- A. Flat bars with minimum cross section dimensions of not less than 3/16 inch by 3/4 inch.
- B. Not less than 2 inches shorter than height of the fabric with which they are to be used.

2.7 BANDS OR CLIPS

- A. Bar bends of not less than 11-gauge sheet steel, 3/4 inches wide for posts 4 inch OD or less and 7/8 inches wide for posts greater than 4 inch OD, in accordance with ASTM F626, and bolted with 5/16 inch diameter galvanized carriage bolts and nuts.

2.8 DIAGONAL TRUSS

- A. Use between terminal and adjacent line posts and for gate framework.
 - 1. 3/8 inch diameter steel rod.

2.9 FITTINGS

- A. Malleable iron or pressed steel of suitable size to produce strong construction.
- B. Post Caps
 - 1. Accommodate passage of top rail.

2.10 GROUT AND ANCHORING CEMENT

- A. Where fence posts are placed into the top of walls and require coring, core and fix in place using:
 - 1. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide manufacturer recommended grout for exterior applications.

2.11 SWING GATES

A. General

1. In accordance with ASTM F900.
2. Gate capable of being opened and closed easily by one person.
3. Paint welded steel joints with zinc-based paint.
4. Attach chain link fabric securely to gate frame at intervals not exceeding 15 inches.

B. Gate posts for gate leaves up to and including 6 ft. wide.

1. 2.875 inch outside diameter steel pipe weighing not less than 4.64 lb. per ft., or 3.50 inch by 3.50-inch roll-formed, steel corner section weighing not less than 5.00 lb. per ft.

C. Gate posts for gate leaves over 6 ft. up to and including 12 ft. wide.

1. 4.00 inch outside diameter steel pipe weighing not less than 8.65 lb. per ft.

D. Gate Posts for gate leaves over 13 ft. wide and up to and including 18 ft.,

1. 6.625 in. outside diameter steel pipe weighing not less than 18.02 lb. per ft.

E. Gate Leaf framework

1. 1 7/8 inch outside diameter steel pipe weighing not less than 2.72 lb. per ft.

F. Hinges

1. Heavy pattern of adequate strength for the gate size.
2. Large bearing surfaces for clamping or bolting in position.
3. Heavy Industrial duty box style, properly sized to suit gate size, non lift off type, offset to permit 180 degree gate opening. Provide a minimum of 2 hinges for each leaf; gates over 6 foot nominal height, provide sufficient hinges to support weight of gate, without sag.

G. Gate Stops

1. Mushroom type or flush plate with anchors, suitable for setting in concrete.

H. Locking Mechanism

1. Provide with a suitable latch accessible from both sides and with provision for padlocking.
2. Double leaf swing gates shall have a center bolt, center stop, and automatic backstops to hold leaves in open position.
3. Ferrule for plunger bar type gate keeper. Provide 3" depth stainless steel ferrules of the correct diameter in both the open and closed positions for all plunger bar type gate keepers. Core and epoxy ferrule (3" depth) in place if finished surface is concrete or provide a concrete footing and support (min. 24"x24"x18") for ferrule if finished surface is either asphalt, pavers, or earth. Top of ferrules shall be flush with finished surface.

I. Padlocks

1. Solid brass cases.
2. Hardened steel shackles.
3. Removable core cylinders.
4. Galvanized steel chains attached to the shackle by a clevis.
5. Padlocks shall be manufactured by Eaton Corp Lock & Hardware Div., Yale Marketing Dept., Charlotte, N.C.; & P&F. Corbin, Div. of Emhart Corp., Berlin, Conn.; Best Universal Lock Co., Inc., Indianapolis, Ind.; or be an acceptable equivalent product.
6. Padlocks shall be furnished with four keys each.

2.12 FOUNDATIONS

- A. Concrete for post foundation bases shall be in accordance with Section 03 30 00, CAST IN PLACE CONCRETE.
- B. Grout for posts set in solid rock shall consist of one part Portland cement and three parts of clean, sharp, well-graded sand with just enough water for proper workability.
- C. At backstops and where ball netting posts are shown, provide standard cylindrical cardboard tube liners for full depth of footing, so that excavations are held vertical and smooth.

PART 3 - EXECUTION

3.1 GENERAL

- A. The fence and gates shall be erected by skilled mechanics with a minimum of 5 years experience installing similar fencing.
- B. Any change in direction of the fence line of 30 degrees or more shall be considered corners. Pull posts shall be used at any abrupt change in grade.
- C. Maximum area of unbraced fence shall not exceed 1,500 square feet.
- D. Terminal posts shall be braced to adjacent posts with horizontal brace rails and diagonal truss rods brought to proper tension so that posts are plumb.
- E. There shall be no loose connections or sloppy fits in the fence framework. The fence framework shall withstand all wind and other forces due to the weather.

3.2 POST SETTING

- A. Post spacing shall uniform with maximum spacing of 10 ft. in fences erected along straight lines. All posts shall be placed plumb and centered in the concrete foundations.
- B. Post foundations in earth shall be concrete cylinders with a minimum diameter of 12 inches, crowned at grade to shed water, and shall not be less than 36 inches deep in the ground. Posts shall be set in the full depth of the foundations except for 3 inch of concrete under the posts.
- C. Coat portion of galvanized or aluminum-coated steel post that will be embedded in concrete with Bitumastic Super Service Black, manufactured by the Koppers Co.; 450 Heavy Themecol, manufactured by Tnemec Co., North Kansas City, MO; or an acceptable equivalent product. Extend coating to 1-inch above top of finished concrete.
- D. If foundation holes are excavated in peat or other unstable soil, the Engineer shall be notified for determination of suitable construction precautions.

- E. If solid ledge is encountered without overburden of soil, posts shall be set into the rock a minimum depth of 12 inch for line posts and 18 inch for terminal posts. Post holes shall be at least 1 inch greater in diameter than the post and the grout shall be thoroughly worked into the hole so as not to leave voids and shall be crowned at the top to shed water. Where solid rock is covered by an overburden, the total setting depth shall not exceed the depths required for setting in earth, and the posts shall be grouted into the rock as described.

3.3 FENCE FABRIC

- A. Fabric shall be stretched taut and tied to posts, rails, and tension wires with the bottom edge following the finished grade not more than 2 inch above the grade. The fabric shall be installed on the security side of the fence (for all sports installations, it shall be on the court or field side of the posts) and shall be anchored to the framework so that the fabric remains in tension after pulling force is released. The fabric shall be attached to line posts with tie wires spaced at not more than 15 inch intervals and to rails and braces at not more than 24 inch intervals. The fabric shall be attached to the tension wire with hog ring ties on 24 inch centers.
- B. Install wind screens where in the quantity and size as shown on drawings.

3.4 CHAIN LINK GATES

- A. Gates shall be installed plumb, level, and secure for the full width of the opening and the hardware adjusted for smooth operation.

END OF SECTION

SECTION 32 32 54

BOULDERS

PART 1 - GENERAL

1.1 SUMMARY

- A. The work included in this Section is for the removal and relocation of Landscape Boulders. Work includes the stockpiling, loading, hauling, organizing, and laying out of Landscape Boulders comprised of on-site weathered boulders.

1.2 REFERENCES

- A. National Building Granite Quarries Association, Inc. (NBGQA)

1.3 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, requirements, apply to this Section.
- B. Related Sections: The following sections contain requirements that relate to this section.
 - 1. Section 31 20 00 EARTH MOVING,
 - 2. Section 31 05 16 AGGREGATE FOR EARTHWORK,

1.4 DEFINITIONS

- A. The definition of trade terms used in these specifications shall be those published by the National Building Granite Quarries Association, Inc. (NBQGA).
 - 1. Arris: Sharp edge or exterior corner formed by the intersection of two surfaces.
 - 2. Face: The exposed major surface of a piece with its specified finish.
 - 3. Joint: The end or side surface of a piece that which is covered when a piece is set in place. Also refers to the open space or filled space that extends the full width of the top surface then vertically or angled downward between the adjacent pieces set in place.
 - 4. Start: The beginning of a crack, caused by quarrying techniques, piece fabrication or handling.
 - 5. Seam: Crack or Fissure.

1.5 SUBMITTALS

- A. The Contractor shall provide qualifications for the following:
 - 1. Pictures of representative boulders (min. 7) to be used prior to bring the boulders on site.
 - 2. Access to the offsite boulders pile(s) for the Engineer to select from as needed.

1.6 QUALITY CONTROL

- A. All installed Landscape Boulders shall be free from jagged, raw or exposed shards, flaws, reeds, rifts, laminations, cracks, seams, or other such defects.
- B. Field fitment when setting stone may require removal of protrusions or faceted portions of the stone to obtain general alignment required. Any fabrication cuts shall be concealed from view or distressed and rusticated. Exposed surfaces of stone shall be free from spots, spalls, chips, stains, discoloration and other defects including variations that would affect the appearance outside the approved sample range.
- C. Set stones shall not move, rock or tip. All stone when fully set shall be immovable. The Engineer may reject any installation that is deemed unbalanced or unstable and require re-setting or re-arrangement of the slabs or boulders.

1.7 HANDLING STONE

- A. Landscape Boulders: Landscape boulders may be handled directly with equipment suitable for retrieval, such as excavators with mechanical or hydraulic thumbs. Chains may be used. The Contractor shall use care when handling the boulders and shall not dump stone on top of stone or fracture, split or otherwise damage intact stones. Boulders damaged beyond useful condition shall be replaced at no cost to the Owner.

PART 2 - PRODUCT

2.1 LANDSCAPE BOULDERS

- A. Retrieve, sort, and organize for re-use boulders as Specified herein and as shown on the Drawings. Provide additional boulders as needed to meet the quantity, size and locations as shown on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION: GENERAL

- A. Select stones that are similar in general appearance and dimensional qualities when shown to intersect or connect to one another or relate to other built elements. Review fitment and composition. Maintain all desired relationships as shown on the plans.

3.2 INSTALLATION

- A. The Contractor shall verify that all conditions are ready for placement of the stone or boulders. Verify that all lay-out and grade information is accurate and complete. Install local reference points or grade stakes for verification.
- B. Ensure that excavation is complete and crushed stone bed is installed with geotextile where so indicated to prevent soils from migrating between any spaces between stones.
- C. All setting shall be performed under qualified supervision. Avoid lifting stone overhead. Always lift to the lowest working height feasible.

- D. Select best stones for each location configuration as shown on the plans.

END OF SECTION

SECTION 32 33 00
SITE FURNISHINGS AND SHADE STRUCTURE

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. The General Documents, as listed on the Table of Contents, and applicable parts of Division 01, GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Contract Documents and all other Sections of the Specifications for requirements therein affecting the work of this Section.
- C. Coordinate work with that of all other trades affecting or affected by work of this Section. Coordinate with such trades to assure.

1.2 DESCRIPTION OF WORK

- A. The work of this section shall include all labor, tools, materials, and appurtenances necessary to install site furnishings and shade structure, as specified herein and as shown in the contract documents, including, (site furnishings and shade structure to be purchased by the Town)
- B.
 - 1. Site Furnishings - Add Alternate No. 1
 - 2. Shade Structure – Add Alternate No. 1

1.3 RELATED WORK UNDER OTHER SECTIONS

- A. The following items of related work are specified and included in other Sections of the Specifications:
 - 1. Section 03 30 00, CAST IN PLACE CONCRETE
 - 2. Section 32 10 00, ASPHALT PAVING

1.4 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00, SUBMITTALS
- B. Provide, installation drawings for each item.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store delivered site furnishings in a dry and safe environment as required by the manufacturer.
- B. Site furnishings which become rusted or damaged due to improper storage or handling shall be rejected and shall be replaced without additional cost to the Owner.
- C. Take all necessary precautions to protect all items from moisture, chipping, cracking, or other damage, during the transportation of these materials to the project, unloading and storage on the

site. After delivery take all necessary precautions to prevent all items from chipping, cracking, construction dust and debris, or damage of any kind. Damaged units will not be allowed to be installed and should any damaged units be found in constructed work, such units shall be removed immediately and replaced with new units, and the Contractor shall assume all expenses incurred.

- D. Stored materials shall be adequately protected against moisture by (1) stacking in such a manner as to allow a complete circulation of air under each stack, and (2) covering each stack, top and sides with a waterproof paper or membrane. Coverings shall remain in place at all times, when not working from the particular stack.

1.6 WARRANTY

- A. All manufactured products to be free from defects in material and/or workmanship for a minimum period of three (3) years from the date of invoice.
- B. This warranty does not apply to damage resulting from accident, alteration, misuse, tampering, negligence, or abuse.
- C. The manufacturer will, at its option, repair, replace, or refund the purchase price of any items found defective upon inspection by an authorized company service representative.

PART 2 - PRODUCTS

2.1 SITE FURNISHINGS (ADDITIVE ALTERNATE NO. 1)

- A. Site Furnishings by Dumor with anchor bolts per manufacturers recommendation.
 - 1. 298-60-2HS 6' ADA STEEL PICNIC TABLE, STEEL

2.2 SHADE STRUCTURE (ADDITIVE ALTERNATE NO. 1)

- A. Shade Structure by Polygon 16' Square
- B. Shade Structure and all appurtenances shall be furnished and installed as part of Additive Alternate No. 1.
 - 1. Please note the foundation detail in the plan set is not final. Contractor to provide foundations. The Contractor shall allow for an increase of size of up to 25% as part of the work. The final detail by the manufacturer shall be coordination with the contractor. The Manufacturer shall provide the following:
 - a. Stamped shop drawings by a Registered Structural Engineer for footings.

2.3 GROUT

- A. Non-shrink grout for anchoring site improvements shall be SUPER POR-ROK ANCHORING CEMENT by CGM or equal.

PART 3 - EXECUTION

3.1 MANUFACTURED SITE FURNISHING INSTALLATION

- A. Install manufactured site furnishings in accordance with the manufacturer's instructions on cement concrete pads where shown and detailed on the drawings or as directed by the Engineer.
- B. All site furnishings to be installed level. Shim with metal washers to level, without rocking.
- C. Anchor site furnishings to surfaces as detailed on the drawings.
- D. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by the Engineer.
- E. For component damage, remove and replace damaged components that cannot be repaired as determined by the Engineer.
- F. Install salvaged material and setting in new concrete pad as needed.

3.2 SHADE STRUCTURE

- A. Install shade structure foundations as per approved engineered and stamped shop drawings and manufacturer's recommendations.
- B. Excavate for footings per approved layout. Form and place rebar, install all embedded items. Pour and finish concrete. Allow to cure 28 days.

END OF SECTION

SECTION 32 91 13
SOIL PREPARATION FOR SEEDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. Provide all materials, equipment, and labor necessary to complete the work as indicated on the drawings or as specified herein.
- B. The principal work of this section includes, but may not be limited to, the following:
 - 1. Grading and Spreading Loam.
 - 2. Preparations of Areas for Seeding and Sodding.
 - 3. Application of Limestone.
 - 4. Application of Lawn Starter Fertilizer.
 - 5. Application of Turf Maintenance Fertilizer.
 - 6. Applying Jute Mesh.

1.3 QUALITY ASSURANCE:

- A. Subcontract work to a firm specializing in such work unless contractor is fully experienced and qualified.
- B. Do not make substitutions without written approval. If specified materials are not available, obtain approval for substitution from the Owner's Representative.

1.4 SUBMITTALS:

- A. Certified analysis and source of off-site loam to be provided. Certification shall list soil additives to loam including rates and type.
- B. Certification and/or labels of proposed soil additives stating names of each.

1.5 PRODUCT DELIVER, STORAGE AND HANDLING:

- A. Protect all products from weather vandalism or other damaging or deteriorating conditions.

PART 2 - PRODUCTS

2.1 SCREENED LOAM:

- A. Screened fertile, friable, medium textured sandy loam with no admixture of refuse or any natural or introduced materials toxic to plant growth and free from subsoil and stumps, roots, brush, stones, clay lumps or other extraneous matter over one inch (1") in any diameter and which will prevent the healthy development of the grass.
- B. Sandy loam shall possess good filtration and permeability rates, and shall possess a mechanical analysis where: N 85% of sand size is 0.5 to 1.0 mm and N 95% of sand mix is between 0.5 and 2.0 mm and no more than 5% of mix is less than 0.5 mm.
- C. Acidity range of approximately pH 5.5 to 7.5 when tested according to methods of testing or A.O.A.C. and organic content not less than 3% nor more than 20% as determined by wet combustion method (Chromic acid reduction). Topsoil may be amended to meet such requirements. Provide analysis prior to delivering topsoil to site, including recommended rates and types of soil additives to achieve desired mix.
- D. On site topsoil (stockpiles) shall be free of debris, roots, and branches. It shall be made to conform to the requirements for sandy loam furnished from the site as specified herein.

2.2 LIMESTONE:

- A. Dolomitic limestone contains up to 50% magnesium carbonate in a dry, granular form. Limestone shall be ground to such a fineness that at least 50% will pass through a 100-mesh sieve and 90% to 100% will pass through a 20-mesh sieve.

2.3 LAWN STARTER FERTILIZER:

- A. Complete fertilizer in granular form, from commercial sources bearing manufacturer's analysis; 10-20-10 ratio of N-P-K.
- B. Significant quantities of trace elements such as iron, boron, etc. shall be contained in the fertilizer.
- C. Fifty percent (50%) of available nitrogen shall be in a slow-release form as found in certain urea form products or natural organic forms or a combination of both.
- D. The salt shall not exceed 35.

2.4 TURF MAINTENANCE FERTILIZER:

- A. Complete fertilizer in granular form, from commercial sources bearing manufacturer's analysis 20-5-10 ratio of N.P.K.

2.5 JUTE MESH:

- A. Jute mesh shall be uniform, open, plain weave of undyed and unbleached single jute yarn, a minimum of four (4) feet in width plus or minus one (1) inch. There shall be 78 warp ends per width and 41 weft ends per yard. Weight shall average 1.22 pounds per linear yard, plus or minus 5%.

- B. Staples for Erosion Control Materials: 9-gauge staples shall be used with jute mesh: 11-gauge with woven paper.

2.6 WATER:

- A. Clean, fresh potable water.

PART 3 - EXECUTION

3.1 GRADING AND SPREADING LOAM:

- A. Remove all debris and other inorganic materials on any prepared subgrades, and reshape and dress any damaged or eroded slopes, swales, and other areas. Scarify and loosen subgrade to a minimum depth of four inches (4") by discing, or other approved method. Establish a friable surface condition in all areas designated to receive loam, employ multiple passes to scarify where compaction may have occurred. Loam shall not be placed until subgrade is in suitable condition and free of foreign objects, excessive moisture, or frozen materials. Stockpiled and off-site loam shall be spread as required on all disturbed and bare areas to produce a total depth of no less than four inches (4") in any location with final depths as shown on the plans and details. Place fill soils and compact to eliminate any irregularities or depressions in existing grades with suitable fill material as specified in Section 31 20 00 prior to spreading loam, then shape and finish grade to the depth of loam as shown in the plans and as specified herein.
- B. Areas to receive loam shall be progressively fine graded, and both machine and hand raked, with stockpiled and off-site loam placed as required to correct depressions and other irregularities, to produce smooth and unbroken finish grades and the depth of topsoil required. Where additional topsoil is placed on existing loam incorporate soil with discing or other approved method to mix soil layers fully to four-inch (4") depth.
- C. Drawings show grading design intent to achieve a uniform grade not less than 1.25% slope. Finish grades shall conform to lines, grades, sections, and shapes of lawn areas as required. Always provide positive drainage unless specifically noted otherwise. Provide smooth, uniform, rounded transitions at all grade changes and breaks in grade. Loam is to be finished for seed at a consistent depth of 1/2" below any adjacent pavement surfaces.
- D. Starter fertilizers: All required materials shall be spread and distributed into the soil at rates and amounts specified herein.
- E. After establishment of finish grade, entire area shall be hand raked and hand rolled.

3.2 PREPARATION OF AREAS FOR SEEDING:

- A. GENERAL DESCRIPTION: This work shall consist of the preparation of the seed bed. Work shall be done as described herein:

1. Areas shall be finely raked to a finished grade. Substantially, all sticks, litter, wire, weeds, cable, or stones larger than one (1") inch in greater dimension shall be removed from the finished grade surface and disposed of off-site or as directed by the Engineer.
2. Where the soil has become compacted, prior to fine raking, areas to be seeded shall be scarified by discing, yolk raking, or other approved method to a minimum depth of two (2) inches.
3. No seeding will be permitted on areas where the seed bed has not been properly prepared or where the soil is compacted.
4. The Contractor shall request inspection of the finished work for approval of the Engineer before proceeding with seeding.

3.3 APPLICATION OF LIMESTONE:

- A. When applied dry, limestone shall be spread evenly and incorporated thoroughly into the soil by discing or other approved means.
- B. When applied hydraulically, no discing will be necessary.
- C. Granular treatment to be applied at the rate of 25 to 50 lbs. per 1,000 square feet or as required by soil pH test to produce a pH of 6.0 to 6.5.

3.4 APPLICATION OF LAWN STARTER FERTILIZER:

- A. After the incorporation of ground limestone into the seed bed, then apply the fertilizer.
- B. Fertilizer shall be applied at the rate of 20 lbs. per 1,000 square feet.
- C. Apply fertilizer according to manufacturer's recommendations.

3.5 APPLICATION OF TURF MAINTENANCE FERTILIZER:

- A. One application of turf maintenance fertilizer will be required before final acceptance of seeded areas.
- B. Fertilizer shall be applied at the rate of 2 lbs. per 1,000 square feet after seeding has been established.
- C. Fertilizer should be applied at a time, which shall be requested in writing by the Contractor, and approved in writing by the Owner's representative.

3.6 APPLYING JUTE MESH:

- A. Jute Mesh shall be installed on all seeded and planted slopes 3:1 or greater.
- B. Apply jute mesh loosely but smoothly to fit the contour of the finished grade, parallel to and in same direction as the flow of water. The up-slope end of each separate strip or piece of jute mesh shall be buried in a six (6) inch minimum vertical anchor slot of junction slot with the soil tamped firmly against the mesh. Where more than one width of material is required, edges shall overlap

a minimum of twelve (12) inches, and the up-slope section of mesh will be on top. Down-hill ends of the jute mesh shall be folded under approximately four (4) inches and stapled in place. Staples will be inserted through the mesh along edges, overlaps, and in the center of all jute mesh strips at intervals not greater than three (3) feet. All anchor slots, junction slots, check slots, and terminal folds shall have five (5) staples spaced not more than nine (9) inches on center across widths.

- C. On seeded banks, jute mesh shall be applied immediately after seeding. On shrub banks, apply jute after finish grading. Cut openings in mesh for each plant and plant and mulch plants as specified. Staple mesh in place to secure openings made for plants.

END OF SECTION

SECTION 32 91 19
PLANTING SOIL AND FINE GRADING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. The work of this Section consists of providing all labor, equipment, materials, incidental work, and construction methods necessary to perform all work and related items as indicated on the Contract Documents and as specified in this Section and includes, but is not limited to, the following:
 - a. Furnishing, testing, placing, spreading, amending and grading of planting soil.
 - b. Stripping, stockpiling screening and resspreading existing topsoil.

B. Related Sections

1. Section 31 25 00, EROSION AND SEDIMENTATION CONTROLS
2. Section 31 20 00, EARTH MOVING
3. Section 32 92 19, SEEDING AND LAWN ESTABLISHMENT
4. Section 32 93 00, PLANTS; TREES, SHRUBS, GROUND COVERS

1.2 QUALITY ASSURANCE

- A. Qualification of Landscape Contractor: The work of this Section shall be performed by a landscape contracting firm which has successfully installed work of a similar quality, schedule requirement, and construction detailing with a minimum of five years' experience. Proof of this experience shall be submitted per SUBMITTALS paragraph of this Section.

1.3 SUBMITTALS

- A. Submit proof of landscape contractor's experience to the Engineer in accordance with QUALITY ASSURANCE paragraph of this Section.
1. Experience: The Contractor shall submit two copies of the proof of experience for the Landscape Contracting firm for this project to the Engineer for review and approval.
- B. Testing shall be at the Contractor's expense. Collect samples per the requirements of the testing laboratory. Contractor shall deliver all samples to testing laboratories via overnight courier and shall have the testing report sent directly to the Engineer. Perform all tests for gradation, organic content, soil chemistry and pH by UMASS Soil and Plant Tissue Laboratory, West Experiment Station, North Pleasant Street, Engineer of Massachusetts, Amherst, MA 01003, (413) 545-2311 or approved equal. Existing on-site screened topsoil shall meet the same testing requirements as loam borrow material.
- C. Loam analysis shall include:

1. Soil pH by water pH and buffer (smp) pH tests, percentage organic content, nitrate nitrogen, ammonium nitrogen, phosphorus, potassium, calcium, aluminum, magnesium, manganese, Micronutrients, Toxins including but not limited to lead, cadmium, arsenic and mercury, Saturated hydraulic conductivity per ASTM D5856, Calculated CEC.
 2. Soil analysis tests shall show recommendations for new lawns for soil additives to correct soils deficiencies as necessary, and for additives necessary to accomplish the work as specified.
 3. Test results: test data and recommendations for soil amendments including but not limited to nitrogen, phosphorus, potassium and limestone.
- D. Limestone: Submit supplier's certification that the limestone being supplied conforms to these Specifications
- E. Fertilizer: Submit product data of seeding fertilizer and certificates showing composition and analysis. Submit fertilization rates for fertilizer product based upon soil testing, analysis, and recommendations as specified, performed, and paid for under in this Section.
- F. Compost: The Contractor shall submit two 10-lb samples of compost to be used in backfill mix accompanied by certified laboratory test results per the requirements of this special provision.
1. Planting Soil Installation Procedures: Contractor shall submit written program containing but not limited to the following:
 - a. Schedules of work
 - b. Description of the equipment that will be used for transport, compaction, and installation of Planting Soil on the Project site.
 - c. Cleanup
 - d. Removal of environmental protections
 2. Acceptance of the program does not relieve the Contractor from the responsibility to conduct the work in strict accordance with the requirements of Federal, State, and local regulations, standards and laws, the Project specifications, or to adequately protect the health and safety of all workers involved in the Project, any members of the public who may be affected by the Project, and the surrounding environmental resources.

1.4 EXAMINATION OF CONDITIONS

- A. All areas to be improved shall be inspected by the Contractor before starting work and any defects such as incorrect compaction, grading or drainage problems shall be reported to the Engineer prior to beginning this work. The commencement of work by the Contractor shall indicate acceptance of the areas to be improved, and assumption of full responsibility for the work of this Section.
- B. The Contractor shall be solely responsible for judging the full extent of work requirements involved.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Loam

1. Loam shall be "fine sandy loam" or "sandy loam" determined by mechanical analysis (ASTM D-422) and based on the "USDA Classification System". Loam shall have the following mechanical analysis:

Textural Class	% of Total Weight	Avg%
Sand (0.05 - 2.0 mm dia. range)	50 - 70	60
Silt (0.002-0.05 mm dia. range)	25 - 35	30
Clay (less than 0.002 mm dia. range)	5 - 15	10

2. Loam shall contain not less than 3.5 percent nor more than 4.5 percent organic matter as determined by the loss on ignition of oven-dried samples.
 3. Loam shall be free of debris and other extraneous matter. It shall be uncontaminated by salt water, foreign matter and substances harmful to plant growth. The electrical conductivity (EC2) of a 1:2 soil-water suspension shall be equal to or less than 1.0 millimhos/cm. (Test minus sieve #10 material). Soils shall not have levels of extractable aluminum greater than 200 parts per million.
 4. No loam shall be delivered to the site until the review and approval of loam test results by the Engineer.
 5. Loam shall be altered per the testing recommendations to support seed germination and turf establishment. Amend as required to ensure the following:
 - a. The loam shall have an acidity range of 6.2 pH to 6.8 pH.
 - b. Macro and Micronutrients levels recommended per the test report.
- B. Screened on-site topsoil.
1. Existing on-site topsoil shall be stripped and stockpiled for re-use. Stripping shall be conducted to minimize mixing topsoil with subgrade materials, roots and other deleterious matter.
 2. Protect stockpile with perimeter erosion controls and/or cover to prevent erosion. Temporarily seed stockpile if stockpile is in place for greater than 60 days.
 3. Screen topsoil to remove deleterious matter and larger stones. Amend topsoil as needed to meet requirements for loam or as otherwise approved.
- C. Manufactured Compost
1. Manufactured Compost shall be mature, stable, weed free, and produced by aerobic decomposition of organic matter. Compost feedstock may include, but is not limited to agricultural, food or industrial residuals; class A biosolids as defined in the EPA CFR Title 40, Part 503; yard trimmings, or source-separated municipal solid waste. The product must not contain any visible refuse or other physical contaminants, substances toxic to plants, or over 5% sand, silt, clay or rock material by dry weight. The product shall possess no objectionable odors.
 2. Manufactured Compost must meet all applicable USEPA CFR, Title 40, Part 503 Standards for Class A biosolids. The moisture level shall be such that no visible water or dust is produced when handling the material.
 3. In addition, Manufactured Compost shall have the following properties:

- a. pH: 5.5 – 7.5
 - b. Organic matter (% dry weight basis): 30 – 65
 - c. Soil salt (electrical conductivity): maximum 5 dS/m (mmhos/cm)
 - d. Moisture content %, wet weight basis: 30 – 60
 - e. Particle size, dry weight basis: 98% pass through 3/4 inch screen or smear
 - f. Stability carbon dioxide evolution rate: mg CO₂-C/ g OM/ day < 2
 - g. Solvita maturity test: > 6
 - h. Physical contaminants (inerts), %, dry weight basis: <1%
 - i. Chemical contaminants, mg/kg (ppm): meet or exceed US EPA Class A standard, 40CFR § 503.13, Tables 1 and 3 levels.
 - j. Biological contaminants select pathogens fecal coliform bacteria, or salmonella, meet or exceed US EPA Class A standard, 40 CFR § 503.32(a) level requirements.
- D. Soil Additives
1. General: Soil additives shall be used to counteract soil deficiencies as recommended by the soils analysis and as supplements for Planting Soil construction as specified herein.
 2. Ground limestone for adjustment of Planting Soil pH shall contain not less than 85 percent of total carbonates and shall be ground to such fineness that 40 percent shall pass through 100 mesh sieve and 95 percent shall pass through a 20 mesh sieve. Contractor shall be aware of Planting Soils pH and the amount of lime needed to adjust pH to meet the requirements of the testing lab recommendations.
 3. Commercial fertilizer shall be a product complying with the State and United States fertilizer laws. Deliver fertilizer to the site in the original unopened containers bearing the manufacturer's certificate of compliance covering analysis and which shall be furnished to the Engineer's Representative. Fertilizer shall contain not less than the percentages of weight of ingredients as recommended by the soil analysis.
 - a. One hundred percent of the nitrogen content shall be derived from organic materials. Nitrogen source shall be coated to ensure slow release. Fertilizer percentages of weight of ingredients shall be as recommended by the soil testing and analysis specified, performed, and paid for under this Section.

PART 3 - EXECUTION

3.1 FILLING AND COMPACTION

- A. Perform all earthwork in accordance with Sections 31 20 00, EARTH MOVING of this Specification.

3.2 GENERAL

- A. Planting Soil shall be protected from erosion at all times. Materials shall be spread as soon as possible after completion of the work of rough grading and excavation and filling has been completed.

- B. Unscreened topsoil shall not be permitted.
- C. Evenly distribute and spread Planting Soil to depths required across the project site.
- D. No Planting Soil shall be handled, planted, or seeded in any way if it is in a wet or frozen condition. A moist Planting Soil is desirable.

3.3 LAWN AREA / FINE GRADING

- A. Immediately prior to dumping and spreading Planting Soil in locations shown on the Contract Documents, the subgrade shall be cleaned of all stones greater than 2 inches and all debris or rubbish. Such material shall be removed from the site, not raked to the edges, and buried. Notify the Engineer that the subsoil has been cleaned and request his/her attendance on site to review and approve subgrade conditions prior to spreading Planting Soil.
- B. After Planting Soil has been spread in turf areas, spread fertilizer and limestone across the surface of the spread Planting Soil and till the Planting Soil to a depth of 6 inches to integrate fertilizer and limestone into the top layer of the Planting Soil.
- C. Remove all large stiff clods, lumps, brush, roots, stumps, litter, and other foreign matter from the Planting Soil. Remove from unscreened soils all stones over 1 inch in diameter from the top 6 inches of the Planting Soil bed.
- D. Sufficient grade stakes shall be set for checking the finished grades. Stakes must be set in the bottom of swales and at the top of slopes. Deviation from indicated elevations that are greater than one-tenth of a foot shall not be permitted. Connect contours and spot elevations with an even slope. Finish grades shall be smooth and continuous with no abrupt changes at the top or bottom of slopes.
- E. During the compaction process, all depressions caused by settlement or rolling shall be filled with additional Planting Soil and the surface shall be re-graded and rolled until presenting a smooth and even finish corresponding to the required grades.
- F. The Contractor shall install Planting Soil in successive horizontal lifts no thicker than 6 inches in turf areas to the required compaction levels as described herein. At the edges of bituminous concrete walkway, the Contractor shall install Planting Soil at a higher level to anticipate any reduction of Planting Soil volume due to settling during the warranty period.
 - 1. Compact Planting Soil to the required density as specified herein.
 - 2. Maximum dry density for Planting Soil shall be determined in accordance with ASTM D698. In lawn areas the following percentages of minimum to maximum dry densities shall be achieved:

<u>Minimum</u>	<u>Maximum</u>
83%	86%
 - 3. The surface area of each lift shall be scarified by raking prior to placing the next lift.
- G. In addition to the range cited above, compact each lift sufficiently to reduce settling but not enough to prevent the movement of water and feeder roots through the soil. The Planting Soil in each lift should feel firm to the foot in all areas and make only slight heel prints. At completion of the Planting Soil installation, the soil should offer a firm, even resistance when a soil sampling tube is inserted from lift to lift. In the presence of the Engineer's Representative probe installed

Planting Soil with Penetrometer to verify Planting Soil compaction is no greater than existing conditions probed at the start of the Contract.

- H. Select equipment and otherwise phase the installation of the Planting Soil to ensure that equipment does not travel over already installed soil. Contractor shall back his way out of the project site.
- I. Disturbed areas outside the limit of lawn work shall be graded smooth and spread with a minimum of 6 inches of Planting Soil to the finished grade.

3.4 ACCEPTANCE

- A. Confirm that the final grade of the Planting Soil is at the proper finish grade elevations. Adjust grade as required to meet the contours and spot elevations noted on the Plans. Request the presence of the Engineer to inspect final grade. Do not precede with the remaining work of this Contract until the Engineer has given his/her written approval of the final grade.

END OF SECTION

SECTION 32 92 19
SEEDING & GRASS ESTABLISHMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. The work of this Section consists of providing all labor, equipment, materials, incidental work, and construction methods necessary to provide maintained turfgrass as well as naturalizing native grass areas, with work including but not limited to seeding of all mixes, establishment, maintenance, and protection.
- B. Related Sections
 - 1. Section 31 20 00, EARTH MOVING,
 - 2. Section 32 91 19, PLANTING SOIL AND FINE GRADING,

1.2 QUALITY ASSURANCE

- A. Qualification of Landscape Contractor: The work of this Section shall be performed by a landscape contracting firm which has successfully installed work of a similar quality, schedule requirement, and construction detailing with a minimum of eight (8) years' experience. Proof of this experience shall be submitted per SUBMITTALS paragraph of this Section.
- B. The Contractor shall provide qualifications for the following: Name, location, years in business (minimum of eight (8) years of related experience) with photographic samples or other proof of projects featuring similar types of projects or related work with regard to scale, size, shape fit and finish. Provide a minimum of three (3) references, with full contact information.

1.3 REFERENCES

- A. None

1.4 SUBMITTALS

- A. Submit proof of Landscape Contractor's experience to the Engineer in accordance with QUALITY ASSURANCE paragraph of this Section.
- B. Fertilizer, erosion control systems for steep slopes, limestone, fiber mulch used for hydroseeding, additives for amendment of soils, and other miscellaneous materials required by this Section: Submit product literature and certificates showing composition and analysis.
- C. Seed: Submit a manufacturer's Certificate of Compliance to the Specifications with each shipment of each type of seed. These certificates shall include the guaranteed percentages of purity, weed content and germination of the seed, and the net weight and date of shipment. No seed may be sown until the Contractor has submitted the certificates.

- D. Submit program for turf establishment to the Engineer for review and consideration. Acceptance by the Engineer of the submitted program does not reduce Contractor obligation to establish a full and healthy turf landscape in all areas.

1.5 EXAMINATION OF CONDITIONS

- A. All areas to be seeded shall be inspected by the Contractor performing the seeding before starting work. The rough grade condition shall be approved. Any defects such as incorrect grading or drainage problems shall be reported to the Engineer prior to beginning this work.
- B. Ensure all substrate is scarified and placed loam is trimmed, graded, and compacted appropriately.
- C. The commencement of work by the Contractor shall indicate acceptance of the areas to be seeded, and the assumption of full responsibility for the work of this Section.
- D. The Contractor shall be solely responsible for judging the full extent of work requirements involved.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. LOAM
 - 1. Loam shall be accordance with Section 32 91 19 – Planting Soil and Fine Grading.
- B. SOIL ADDITIVES
 - 1. Soil additives if so required, shall be provided under Section 32 91 19, Planting Soil and Fine Grading.
 - 2. Additional applications of fertilizer shall be provided under this, based upon recommendations from soil analysis and testing as specified under Section 32 91 19, Planting Soil and Fine Grading.
- C. SEED-GENERAL
 - 1. Seed mixture shall be fresh, clean, new crop seed. Grass shall be of the previous year's crop and in no case shall the weed seed content exceed 0.25% by weight. The seed shall be furnished and delivered in the proportion specified below in new, clean, sealed and properly labeled containers.
 - 2. Seed shall be mixed by a dealer. Contractor shall furnish the Engineer the dealer's guaranteed statement of the composition of the mixture.
 - 3. All seed shall comply with State and Federal seed laws and shall carry 'Certified State of Origin' tags on their bags or containers at the time of seeding. Seed shall conform to applicable state seed laws and standards of minimum purity, minimum germination, maximum crop seed, maximum weed seed, and be free of noxious weed seed as specified in this Section.

2.2 SEED MIXES

- A. GENERAL:

1) Seed Mix Type A - Maintained Lawn

- B. Turf type grasses shall be selected for the following desirable traits:
- C. Tall fescue, Perennial ryegrass, Fine fescue cultivars/selections shall have a Turf Quality rating greater than or equal to 6.0 on average for the preceding 4 years as determined by cited turf trials. Fine fescues shall be selected so that, in aggregate, the cultivars/selections provide high turf density, quick establishment, tolerance to summer heat and humidity, and disease resistance.
 - a. Seed Mixture - Event Space / Maintained Turfgrass
 - 20% Aztec II Tall Fescue
 - 20% Escalade Tall Fescue
 - 15% Allaire II Perennial Ryegrass
 - 45% Blue Bonnet Kentucky Bluegrass
 - b. Seeding rate for the Maintained Lawn Areas – Seed Mix shall be 8 pounds per 1,000 square feet.
- D. FERTILIZERS
 - 1. Fertilizer shall be a commercial product complying with the State and United States fertilizer laws. Deliver to the site in the original unopened containers that shall bear the manufacturer's certificate of compliance covering analysis. Fertilizer shall contain not less than the percentages of weight of ingredients as recommended by the soil analysis specified, performed, and paid for under the Section 32 91 19, PLANTING SOIL AND FINE GRADING
- E. EROSION CONTROL BLANKETS
 - 1. Provide additional erosion control as needed.
 - a. Erosion control blankets shall be utilized on all slopes 3:1 or greater and shall be for short-term use with functional longevity of no less than 12 months duration.
 - b. Blankets shall have consistent thickness with straw evenly distributed over the entire area of the mat. Matrix of straw fiber shall be 0.5 lbs/yd².
 - c. The blanket shall be covered on the top and bottom sides with 100 percent biodegradable woven natural jute fiber netting. Top netting shall be 9.3 lbs/1000 ft². Bottom netting shall be 7.7 lbs/1000 ft².
 - d. Thread shall be degradable.
 - e. Erosion control blankets shall meet all requirements of the Erosion Control Technology Council Specification and the FHWA Standard Specification FP-03 Section 713.17, type 2.D Short-term Double Net Erosion Control Blanket
- F. HERBICIDES, CHEMICALS, AND INSECTICIDES
 - 1. Provide chemicals and insecticides as needed for fungus or pest control.
 - 2. Provide post emergent crab grass control throughout the maintenance period to ensure a germinated and mown lawn free of crab grass.
- G. WATER

1. Contractor shall provide all water, machinery and labor required to establish turfgrass in maintained areas. During the establishment and maintenance period the Contractor shall irrigate as required to ensure sufficient water is applied to all seeded areas to ensure germination, growth, and establishment of all permanent grass species. Soluble salt levels in irrigation water shall be less than 1 mmhos/cm (ds/m).

PART 3 - EXECUTION

3.1 SOIL PLACEMENT

- A. Coordinate with other phases of the work. See Section 32 91 19, PLANTING SOIL AND FINE GRADING.
- B. Inspect site conditions prior to loam placement. Verify subsurface of areas to receive loam were adequately scarified to a minim depth of two (2) inches and that loam was incorporated into the sub grade.
- C. Once loam is placed protect it from excessive compaction from foot traffic, machinery, materials stockpiles, excessive rain etc. that will harden the surface and restrict grass establishment.
- D. Loam for seed beds in Infiltration Basins shall be dumped and left slightly irregular. Variations of up to 3" shall be allowed.

3.2 SEEDING

- A. Contractor shall obtain Owner Representative's approval of fine grading and bed preparation before doing any seeding.
- B. Limit of grading and earthwork shall be limit of seeding unless otherwise indicated on the Contract Documents. All areas disturbed outside the limit of seeding shall be prepared and seeded as specified herein at no additional cost.
- C. The season for seeding shall be from April 1 to June 1 and from August 15 to September 30. The actual planting of seed shall be done, however, only during periods which are normal for such work as determined by weather conditions and by accepted practice in this locality.
- D. To prevent compaction, loss of soil via water and wind erosion and to prevent the flow of sediment, fertilizer, and pesticides onto roadways, sidewalks, and into catch basins, seed within 5 Days of spreading the soils.
- E. Seed only when the bed is in a friable condition, not muddy or compacted.
- F. Means and methods of seeding shall be determined by the Contractor based on his/her experience, site conditions, season of seeding, weather conditions and any, all, or other environmental conditions. Seeding may be by Hydroseeding other method selected by the Contractor and accepted by the Engineer.
- G. Application rate for seeding shall be as described above or if not explicitly listed, as per plan sheet L.1.2 Overall Planting Plan.

3.3 EROSION CONTROL MATTING

- A. Erosion and sediment controls shall be in accordance with Section 31 25 00, EROSION AND SEDIMENTATION CONTROLS
- B. Install Erosion control blankets on slopes of 3:1 and greater and in drainage swales where erosion could occur and as directed by the engineer. Erosion Control shall be installed immediately after seeding operations. Install blankets in accordance with manufacturer's written instruction.
- C. Blankets shall be installed perpendicular to slopes and shall extend at least 3 feet beyond slope crest. Fibers shall be placed in contact with the soil for the entire length of the blanket. Provide check slot at top of slope and anchor slot at bottom of slope where indicated.
- D. Do not stretch the fabric. In drainage swales, center the fabric along the flow line. Install the matting in a check slot at the top and bottom of the slope of the area to be covered. Check slots shall be 6 inches deep and 6 inches wide. Fabric shall extend down one wall of the check slot and across the full width of the base. Overlap edges of matting rolls 4 inches minimum and overlap the ends 18 inches at a minimum.
- E. Install staples in check slots, edges, center and ends of rolls by driving specified steel staples 2 feet on center over the entire area to be covered, except at check slots and ends of rolls, where staples shall be placed 6 inches on center.
- F. Fill check slots with Topsoil and tamp firmly.
- G. Following blanket installation, roll the entire area with a smooth drum roller weighing between 50 and 75 pounds per linear foot of roller. The finished installation of blanket shall be firmly in contact with the soil and provide a smooth, finished appearance free from lumps or depressions.

3.4 TURFGRASS ESTABLISHMENT

- A. The following general requirements shall apply to all maintained turfgrass establishment:
- B. Submit program for turf establishment of all seed types to the Engineer for review and consideration. Acceptance by the Engineer of the submitted program does not reduce Contractor obligation to establish a full and healthy turf grass in areas indicated.
- C. Perform all seeding, mulching and/or culti-packing operations in a manner that will prevent erosion. Soil erosion by wind, rainwater, snow melt or over irrigation resulting in damage to or loss of seed bed, germinated cotyledons or growing turf will require restoration and re-establishment of planting soils and grasses and an extension of the maintenance and guarantee period at no addition cost to the Owner.
- D. Ensure direct seed to soil contact. Under no circumstances shall seed be separated from direct contact with the planting soil. Any program element that does not include direct seed to Topsoil contact will be rejected.
- E. Seed distribution shall be uniform, even, and consistent in all areas. Seed application system(s) shall accommodate different seed types, shapes, weights, and sizes.

3.5 TURFGRASS MAINTENANCE

- A. Maintenance shall begin immediately after any area is seeded and shall continue until Final Acceptance of the project. In the event that seeding operations are completed too late in the fall

season for adequate germination and growth of grass, then maintenance shall continue into the following spring for the minimum 120 Day period or until Final Acceptance, whichever occurs later. Install blankets or netting to prevent loam degradation and movement over the winter. Submit product literature and samples of erosion control system to the Engineer for review and approval. Blankets and netting shall be placed in a timely manner at no additional cost to the Owner.

- B. Maintenance shall include reseeding, mowing, watering, weeding, fertilizing a minimum of two times in addition to the fertilizer incorporated by harrowing as part of the placement of the loam soil, and resetting and straightening of protective barriers. Maintained lawn areas may require maintenance to include chemical treatments as required for fungus and/or pest control.
- C. During the maintenance period, any decline in the condition of seeded areas shall require immediate action to identify potential problems and to undertake corrective measures.
- D. Watering shall be done in a manner that will provide uniform coverage, prevent erosion due to application of excessive quantities of water over small areas, and prevent damage to the finished surface by the watering equipment.
 - 1. The Contractor shall provide all labor and manage all watering necessary to establish an acceptable lawn. In the absence of adequate rainfall, watering shall be performed daily or as often as necessary to maintain moist soil to a depth sufficient to provide germination, growth, and establishment. At no time shall a tank truck be allowed on the seeded beds.
 - 2. Watering shall be done in a manner that will provide uniform coverage, prevent erosion due to application of excessive quantities over small areas, and prevent damage to the finished surface by the watering equipment. The Contractor shall furnish sufficient watering equipment to apply water to the loam bed to ensure germination, growth, and establishment until Final Acceptance.
 - 3. Watering may be performed by the installation of a temporary irrigation system, utilizing yard hydrants installed as part of the park improvements. The Contractor is responsible for all irrigation components and watering operation.
 - 4. Municipal water utilized for the project shall be metered and paid for by the Contractor.
- E. After the grass in seeded areas has germinated, reseed all areas and parts of areas that fail to show a uniform stand of grass. Reseed such areas and parts of areas repeatedly until all areas are covered with a satisfactory growth of grass.
- F. Reseeding operations shall be timed to maximize germination, based on weather conditions and temperature and season. Work includes any necessary aeration to address poor root development as a result of excess compaction, along with any necessary grading, fertilizing, and topdressing, performed at the Contractor's expense.
- G. The Contractor shall keep turf grass areas mowed until Acceptance of the contract by cutting to a height of 2 inches when growth reaches 3 inches or as directed by the Engineer.
- H. At each mowing, the Contractor shall edge the walks, drives, plant beds, and other border conditions shall be edge trimmed by hand or machine to produce straight and uniform edge conditions.
- I. Remove and discard from paved areas only clippings and debris generated by each mowing and edging operation legally off-site. Engineer, if practical and aesthetic, may allow sweeping (not

blowing) clippings back into grass. Mowers shall be equipped with mulching blades. Do not remove from grass areas any clippings that have been generated by mowing operations. Do not mow grass when wet.

- J. Fertilizing: The first application of fertilizer is specified, purchased, performed, and paid for under the 32 91 19, PLANTING SOIL AND FINE GRADING. A second application of fertilizer shall be quick release and shall be applied to seeded lawn, slope and buffer areas at the time of the first mowing and shall be performed and paid for under this Section 32 92 19. This second application shall be applied at a rate that ensures that one-half pound of nitrogen is applied per 1,000 square feet. Phosphorus and potassium shall be applied proportionally in accordance with the recommendations of the soil tests and the quantities previously integrated into the soil during the first application. A third application of 100 percent slowly soluble or slow release nitrogen fertilizer shall be applied to seeded areas approximately two months after the second application. This third application shall correspond to the following application rates dependent upon the month of application. Fertilizer application rates shall be based upon soil testing results.
 - 1. May 1-15: Apply 1.0 pound of nitrogen per 1,000 square feet.
 - 2. June 15-30: Apply 1.0 pound of nitrogen per 1,000 square feet.
 - 3. August 15 through September 15: Apply 1.0 pound of nitrogen per 1,000 square feet.
 - 4. November 1-15: Apply 1.5 pounds of nitrogen per 1,000 square feet.
- K. Reset and replace all lawn protection fencing as required to prevent access onto lawn areas.
- L. During the maintenance period, any decline in the condition of seeded areas shall require immediate action to identify potential problems and to undertake corrective measures.
 - 1. The Contractor shall provide all labor and arrange for all watering necessary to establish an acceptable lawn. In the absence of adequate rainfall, watering shall be performed daily to promote the germination and growth of specified grass species and varieties.
 - 2. Watering shall be done in a manner that will provide uniform coverage, prevent erosion due to application of excessive quantities over small areas, and prevent damage to the finished surface by the watering equipment. The Contractor shall furnish sufficient watering equipment to apply water to the required soil depths each 8-hour period.
- M. The Contractor shall return to the site at the beginning of the next seeding season and spread limestone across all lawn areas installed under this Contract. Limestone shall be spread at rates determined by the soil tests specified.

3.6 TURFGRASS ACCEPTANCE

- A. Final Season Seeding and Turnover
 - 1. Substantial Completion is anticipated on or about September 29. The intent of the design is for all final loam placement, fine grading, and seeding to occur during late summer or early fall, immediately preceding Substantial Completion.
 - 2. The Contractor shall perform initial seeding, watering, fertilizing, and erosion control installation as specified and shall maintain all seeded areas through the end of the Contract maintenance period or until directed otherwise by the Engineer.
 - 3. At the time of Substantial Completion, the Contractor shall:

4. Install and maintain temporary orange snow fencing around all newly seeded lawn areas to prevent access and disturbance.
5. Transfer ongoing lawn establishment responsibilities to the Town, including continued watering, mowing, and maintenance necessary for full establishment.
6. Provide the Town with written lawn establishment and maintenance instructions consistent with the requirements of this Section.
7. If at the end of the growing season the grass has not achieved satisfactory establishment as determined by the Engineer or the Town, the Contractor shall, upon reasonable notice from the Town, provide reasonable accommodations to the lawn areas to protect the seeded surfaces over the winter (such as re-stabilization or resetting of fencing), and re-establish the turfgrass during the following spring growing season at no additional cost to the Owner.
8. The temporary fencing shall remain in place until the lawn has achieved sufficient establishment to withstand pedestrian activity, as determined by the Town. The cost of fencing installation and any necessary resetting shall be included in the Contractor's bid price for this Section.
9. Following the minimum required maintenance periods for turfgrass areas. The Contractor shall request the Engineer in writing for a formal inspection of the completed work. Request for inspection shall be received by the Engineer at least 10 Days before anticipated date of inspection.

B. Acceptance Requirements

1. At the end of the maintenance period, seeded areas shall have a close stand of grass as defined above with no weeds present and no bare spots greater than 3 inches in diameter over greater than 5 percent of the overall seeded area. At least 90 percent of the grass established shall be permanent grass species. If seeded areas are deficient, the Contractor's responsibility for maintenance of all seeded areas shall be extended until deficiencies are corrected. Seeded areas to be corrected shall be prepared and reseeded in accordance with the requirements of this specification.
 2. At the time of acceptance, the Contractor shall remove temporary barriers used to protect lawn areas.
- C. Furnish full and complete written instructions for maintenance of the lawns to the Owner at the time of acceptance in conformance with Submittals requirements.
- D. Engineer's inspection shall determine whether maintenance shall continue in any part.

3.7 SEED OF NATURALIZING AREAS

- A. Submit program for establishment of all naturalizing seed types to the Engineer for review and consideration. Acceptance by the Engineer of the submitted program does not reduce Contractor obligation to establish a full and healthy stand of naturalizing grasses in areas indicated.
- B. Ensure surfaces to receive seed are weed free and bare. Remove any mulch or wood chips or other surficial material that would prevent the seed from contacting soil. Soil surface set to receive seed must not be overly compacted.
- C. Insert a ½" dia. rebar three (3") inches into the loam seed bed to verify seed bed is adequately prepared. If penetration is less than 3' the seed bed shall be harrowed or rototilled to achieve a friable condition.

- D. Perform all seeding with mulching operations in a manner that will prevent erosion. Soil erosion by wind, rainwater, snow melt or over irrigation resulting in damage to or loss of seed bed and will require restoration and re-establishment of planting soils and grasses and an extension of the maintenance and guarantee period at no addition cost to the Owner.
- E. Ensure direct seed to soil contact. Under no circumstances shall seed be separated from direct contact with the planting soil.
- F. Seed distribution shall be uniform, even and consistent in all areas. Seed application system(s) shall accommodate different seed types, shapes, weights and sizes.

3.8 CLEAN UP

- A. Absolutely no debris may be left on the site. Excavated material shall be removed daily by the Contractor as directed. Repair any damage to site or structures to restore them to their original condition, as directed by the Landscape Architect, at no cost to the Owner.

END OF SECTION

SECTION 32 93 00

PLANTS: TREES, SHRUBS, AND GROUNDCOVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Provide all materials, equipment, and labor necessary to complete the work as indicated on the drawings or as specified herein.
 - 1. The principal work of this section includes, but may not be limited to, the following:
 - a. Layout and Excavation of Plant Holes
 - b. Planting and Backfilling
 - c. Watering
 - d. Pre-emergent Weed Control
 - e. Mulching
 - f. Fertilizing
 - g. Staking and Guying
 - h. Anti-desiccant Application
 - i. Tags and Labels
 - j. Plant Replacement Guarantee

1.3 REFERENCES

- A. ANSI Z260.1 - Nursery Stock, latest edition, published by the American Association of Nurserymen, Inc. (AAN).
 - 1. SPN: "Standardized Plant Names," latest edition, by the American Joint Committee on Horticultural Nomenclature.
 - 2. AOAC: "Association of Official Agricultural Chemists".
 - 3. Massachusetts Standard Specifications – Latest edition of the Standard Specifications for Highways, Bridges, and Waterways, The Commonwealth of Massachusetts, Department of Public Works, Latest Edition.
 - 4. Pruning Standards: ANSI A300 Practices for Trees, Shrubs & Other Woody Plant Maintenance: Secretariat, National Arborist Association, PO Box 1094 Amherst, NH 03031.

1.4 QUALITY ASSURANCE

- A. The planting shall be done by horticultural skilled workers, trained, and experienced in accepted nursery practices. The work shall be done under the supervision of a qualified planting supervisor demonstrating a background in landscape operations.
 - 1. An arborist, licensed by the state in which the work is to be performed, is required for all pruning work.
 - 2. At least one tree and one shrub of each variety is to be tagged with a waterproof tag or seal bearing legible designation of botanical and common names, and all other standard products shall be delivered sealed and unbroken.
 - 3. Do not make substitutions without written approval. If specified landscape material is not available, obtain approval for substitution from the Owner.
 - 4. At least thirty (30) days prior to intended use, the Contractor shall provide the following samples and submittals for approval. Do not order materials until Owner's approval of submittal has been obtained. Delivered materials shall closely match the approved samples. Should the source of supply be changed within the course of the contract, the Contractor shall submit new samples or submittals for approval per the original submission.
- B. Plant Material: Contractor shall provide written certification as to source of plant material and species/cultivars to be supplied.
- C. Loam for Plants: The Contractor shall provide samples as necessary for the testing laboratory's use, from each proposed source.
- D. Fertilizer: Submit one (1) sample packet of fertilizer and six certificates showing composition and analysis for fertilizer, also submit invoices of total purchased material for this contract.
- E. Planting Mulch: Submit a one- (1) cubic foot sample.
- F. Tree Staking Accessories – Submit manufacturer's literature and sample.
- G. Suppliers receipted invoices for moisture retention material and fertilizer packets. Invoice shall state that material was furnished for this project.
- H. Watering Schedule: See 3.2 and 3.4
 - 1. Where formal planting arrangements are shown, select stock with uniform height and spread, and label with numbers to assure symmetry in planting.
 - 2. The Owner reserves the right to inspect all plant materials for compliance with specifications, and to reject unsatisfactory or defective work at any time during progress of work.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. All areas to be planted shall be inspected by the Contractor before starting work and any defects shall be reported to the Owner prior to beginning this work. The commencement of work by the Contractor shall indicate acceptance of the areas to be planted and assumption of full responsibility for the work of this Section.
- B. The Contractor shall be solely responsible for judging the full extent of work requirements involved, including, but not limited to the potential need for storing and maintaining trees temporarily and/or re-handling plants prior to final installation.

- C. Protect all plants and products from weather or other damaging or deteriorating conditions.
- D. Plants which have been damaged or have deteriorated in transit or storage are not acceptable.
- E. Keep plants moist, fresh, and protected against exposure to sun, wind, and freezing temperatures whether in the receiving yard, in transit, while being handled, or at the job site awaiting planting.
- F. Deliver trees, shrubs, and groundcover after preparations for planting have been completed and plant immediately.
- G. Planting Dates: Prepare a proposed planting schedule. Schedule dates for each type of landscape work during normal seasons for such work. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.
 - 1. Planting Deciduous material: Spring: March 15 to June 15
Fall: September 15 to December 1
 - 2. Evergreen material: Spring: March 15 to May 30
Fall: August 15 to November 15
- H. All trees shall be planted within the same season that they are dug. No heeling in of trees over the winter or planting out of season will be permitted.
 - 1. Those species known to be fall digging hazards shall be dug during the spring season only. Fall planting of these species shall be permitted only with certification from the nursery at the time of digging, and at the discretion of the Owner.
 - 2. Correlate planting schedule with specified maintenance periods to provide maintenance to date of acceptance.
 - 3. Coordination with Lawns: Plant trees, shrubs, and groundcover after final grades are established and prior to planting of lawns, unless otherwise acceptable to Owner. If planting of trees and shrubs occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

1.6 SPECIAL CONDITIONS

- A. Should discrepancies exist between plant quantities or plant sizes as shown in the Planting Schedule and on the Planting Plan, quantities and sizes shown on the Planting Plan shall govern. Contractor shall then install all plants as shown on the plan at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 SCREENED LOAM

- A. Screened loam shall be per section 32 91 19 - PLANTING SOIL AND FINE GRADING

2.2 COMPOST

- A. Compost shall be per section 32 91 19 - PLANTING SOIL AND FINE GRADING

2.3 ANTI-DESICCANT

- A. Emulsion which permits transpiration while retarding excessive loss of moisture from plants. Deliver in manufacturer's fully identified containers and mix according to manufacturer's direction.

2.4 TREE AND SHRUB FERTILIZER

- A. Fertilizer for amending loam to meet test laboratory requirements for the particular type of planting to be done shall be a non-phytotoxic bio stimulant formulated to promote rapid root growth and regeneration. It shall be derived from organic composts and humus extracts and is compatible with fertilizers, herbicides, pesticides, fungicides and absorbent gels.
- B. In addition to the soil amendment required above, fertilizer shall be provided for each plant through the use of slow-release fertilizer packets, packaged in plastic sacks with micropore holes, which provide for a controlled release of nutrients gradually over a minimum eight-year period. Tablets are acceptable.
- C. Each packet shall consist of four ounces of water-soluble fertilizer with a minimum guaranteed analysis of available elements as follows:
 - 1. Nitrogen 16%
 - 2. Phosphoric Acid 8%
 - 3. Potash 16%
 - 4. mycorrhizal fungal inoculant
 - 5. Mycorrhizal fungal inoculant shall contain both endo and ecto mycorrhizae.
 - 6. Mycorrhizal fungal inoculant shall be:
 - 7. Mycor Tree Saver Transplant by Plant Health Care, Inc., Pittsburg, PA.
 - 8. MycoApply by Mycorrhizal Applications, Grants Pass, OR.
 - 9. Mycorrhizal Landscape Inoculant by BioOrganics, New Hope, PA.
 - 10. Or approved equal.

2.5 STAKE AND GUYING MATERIALS

- A. Guy web: Shall be a low abrasion woven fiber webbing with a break strength of 900 pounds or better. The width of the webbing shall be no less than 5/8 inch, nor greater than 3/4 inch. The length shall be sufficient enough to be attached to the tree trunk and stake.
- B. Stakes: Shall be on a hardwood source, free of knots, insects, and fungi. Stakes shall be of uniform size and shape and shall be a minimum of two inches (2") x three inches (3") x eight feet (8'). Stakes shall be pointed with a taper of no less than four inches (4") and driven three feet into the ground.
- C. The above ground stake height shall be eight inches (8") above the point of attachment. The type of stakes shall be uniform throughout the job. The top ten inches (10") of the stakes shall be tapped with red duct tape.

2.6 PRE-EMERGENT WEED CONTROL

- A. Pre-emergent weed control shall be provided for all trees, shrubs, and groundcover plant beds. Deliver in manufacturer's fully identified containers and apply according to manufacturer's directions.

2.7 MULCH

- A. Pine Bark Mulch shall be derived from softwood evergreen tree bark aged to a minimum of six months and no more than eighteen months. The bark shall be shredded so that the resulting pieces are no more than one half inch (1/2") thick and no longer than three inches (3"). The mulch shall be free of stringy material and shall not contain an excess of fine particles. The mulch shall be brown in color, free of leaves, twigs, sod, weeds, shavings, and other foreign materials which are injurious to healthy plant growth.
- B. Mulch shall be ninety-eight (98) percent organic matter with a pH range of 3.5 to 4.5. Moisture content of packaged material is not to exceed thirty-five (35) percent.

2.8 WATER

- A. Clean, fresh potable water, free from injurious chemicals and other toxic substances harmful to plant life. No brackish water will be permitted.

2.9 PLANT MATERIALS

- A. General: Plant materials shall conform in size, grade, and quality to the "American Association of Nurserymen Standards for Nursery Stock," as approved by the American National Standards Institute (ANSI) in effect at the time of bidding.
 - 1. Plants of other kinds than those named in the Plant Schedule on the Drawings shall not be accepted without written approval of Owner.
 - 2. All plant material shall comply with the state and federal law with respect to inspection for plant disease and insect infestation.
 - 3. Replacement plants larger in size than those specified may be used if approved by Owner, provided use of larger plants does not increase Contract price.
 - 4. If use of larger plants is approved, increase ball of earth for spread of roots in proportion to size of plant.

2.10 SELECTION OF NURSERY STOCK:

- A. At least fourteen (14) days prior to the date on which the plant selections are to be made and at least 28 days prior to the expected planting date, the Contractor shall request, in writing, that the Owner designate a representative from its technical staff to select and tag trees to be furnished.
- B. The letter of request shall also have attached a certification from the supplier attesting to the fact that the stock to be selected from is, in fact, the particular plants required under this Section. No substitutions will be permitted.

- C. The Contractor shall arrange for and bear the cost of transportation, meals in transit, and overnight accommodations, if necessary, for the Owner's representative during the period of time required to select and tag the required number of stock.
- D. All trees shall be tagged at the source prior to digging. The Owner will inspect and tag all trees with the Contractor.
- E. The Owner shall provide the necessary tags or seals for identifying the trees at the source. The tags are of durable construction and are numbered sequentially with raised lettering.

2.11 GENERAL QUALIFICATIONS:

- A. Plants shall be good examples of their species or variety, with uniform, well developed branch structure, balanced head, and single leader.
- B. All plants shall be in accordance with the American Standard for Nursery Stock of the American Association of Nurserymen.
- C. Trees shall be freshly dug. No plants from cold storage or previously heeled in stock will be accepted.
- D. All plants shall be nursery grown. No collected plants will be accepted.
- E. Only plants grown with in Hardiness Zones 1 through 5, as established by the Arnold Arboretum, Jamaica Plain, Massachusetts, or USDA zones 2-6 will be accepted. The Contractor shall certify in writing that the stock has been grown under Zone 5 or hardier conditions. Plants will not be accepted without such certification.
- F. Plants shall be sound, healthy, and vigorous of growth, free of disease, insect pests, eggs, or larvae. All parts shall be moist and show active green cambium when cut.

2.12 TREE ROOTS

- A. The root system of each tree shall be well provided with dense, fibrous roots.
- B. Root systems shall be solid natural balls of earth firmly wrapped with untreated eight (8) ounce organic burlap, securely held in place by stout cord or wire. Processed or manufactured root balls or inorganic (plastic) burlap will not be accepted. No trees will be accepted if the ball of earth surrounding its roots has been badly cracked or broken.
- C. The diameter and depth of the root ball must be sufficient to encompass the fibrous and feeding root system necessary for healthy development of the tree.

2.13 TREE TRUNK

- A. The trunk of each tree shall be a single uncut leader and straight trunk growing from a single unmutilated crown of roots. No part of the trunk shall be conspicuously crooked as compared with normal trees of the same variety. No trees, which have had their leaders cut, scared, scraped, bruised, or wounded, will be accepted.
- B. The trunk shall be free from sunscald, frost cracks, or wounds resulting from abrasions, fire, insect or disease damage, or other causes. No pruning wounds shall be present having a diameter exceeding two inches and such wounds must show vigorous bark growth on all edges. Trees shall not be pruned prior to delivery.

2.14 TREE HEIGHT:

- A. When indicated, the overall height of the trees (measured from the crown of the roots to the tip of the top branch) shall be not less than the minimum size designated.
- B. Height from the ground to the lowest branch shall be eighty (80) inches. The required height to the lowest branch may be accomplished by pruning after installation if, in the Owner's opinion, this does not detract from the shape or form of the tree or cause unsightly scars.

2.15 HANDLING:

- A. Plants shall be dug, handled, and transported to prevent damage of any sort including but not limited to breakage of branches, scraped or bruised trunk, or broken root ball.
- B. Plants shall be protected from desiccation during digging, storage, and transportation by watering, covering, and application of anti-desiccants, as necessary to ensure their continued health and viability.
- C. When plants cannot be transported and planted immediately upon being dug they shall be stored and protected from desiccation and extremes in temperature by being heeled in, watered, and/or sprayed with an anti-desiccant.

2.16 INSPECTION UPON DELIVERY:

- A. Inspection and approval of plants at the source shall not impair the right of subsequent inspection and rejection upon delivery to the site, if the Owner finds that the plants have declined noticeable due to handling abuse, lack of maintenance, or other causes. Costs of replacements for plants found deficient at time of delivery shall be borne by the Contractor.

PART 3 - EXECUTION

3.1 PLANTING

- A. Layout: Determine location of underground utilities and layout plants so as to avoid possible damage to such structures. Plant pits and bed locations, per plans, shall be staked on ground by contractor and approved by the Engineer prior to excavation. Should discrepancies exist between plant quantities in Planting Schedule and Planting Plan, quantities shown on the Planting Plan shall govern. Adjustments in locations and outline shall be made as directed in field. Labor, equipment, and new smooth stakes are to be furnished by the Contractor for this purpose.
- B. The Contractor shall coordinate with the Engineer to locate Plant Accent Modules. Modules shall be located on a site-specific basis, based on field conditions.
- C. Excavation: Planting beds and pits shall conform to the approved staked locations and outlines. Holes dug for plantings shall, in all cases, be large enough to accommodate the complete root system of the plant (tree, shrub, and groundcover) to be received, as well as sufficient amounts of approved backfill around the periphery of the root ball as shown on the details.
- D. Scarify all sides, edges, and the bottom of the holes to a 2" minimum depth in a manner that promotes soil mixing and root development. Conduct additional excavation or scarifying based on field conditions, as directed by the Engineer.

- E. All sod, weeds, roots, cobbles, and stones and other objectionable materials excavated from the plant holes which is unsuitable for use as backfill, shall be removed from the site immediately and disposed of legally. If the subsoil appears to be injurious to plant health, the Contractor shall, at the Owner's direction, fill the planting pit with enough planting backfill mix to provide a twelve (12) inch depth when firmly tamped in place, prior to setting trees in place. If the subsoil does not appear to be deleterious, the root ball shall be set directly on level, undisturbed subgrade.
- F. Plant Hole Size: The minimum plant hole size, unless otherwise specified on the plans or directed by the Owner's Representative, shall be as follows:
 - 1. Trees and Shrubs - The planting hole shall be twice the diameter of the root ball in width, and no deeper than two inches (2") less than the distance from the bottom of the root ball to the root flare (i.e. a 12" tall ball will require a 10" deep hole). Any excavation in excess of that required, shall be replaced and compacted to eighty-five percent (85%) of maximum density.
 - 2. Groundcover - The planting hole shall be twice the diameter of the root ball in width and equal to the depth from the bottom of the root ball to the level at which it was grown in the nursery. Any excavation in excess of that required shall be replaced and compacted to eighty-five percent (85%) of maximum density.
 - a. Any rocks or underground obstructions shall be removed to a depth necessary for planting as specified unless alternate locations for the planting are approved by the Engineer. If removal of obstructions results in a deeper hole than specified for planting, backfill material shall be added and compacted to eighty-five percent (85%) of maximum density to the correct depth.
- 1) Plant Backfill Mix: Add Loam for Plants to soils excavated from the planting hole to create mix for all plants installed, unless otherwise directed by the Engineer. Plant Backfill Mix shall be at least thirty-three percent (33%) loam.

3.2 SETTING PLANTS

- A. Plants shall be handled in such a manner that the soil of the root ball will not be loosened from the roots. Carefully place plant into the prepared hole. Cut and remove rope and wires and remove or layback the top 2/3 of burlap off the root ball, if the ball is wrapped in burlap and rope tied. Do not pull burlap and wires out from under the root ball. Remove all non-biodegradable root ball materials if present. Set plants plumb and fill in around the football to two thirds (2/3) the depth of the hole with backfill mix. Thoroughly tamp the backfill mix to eighty-five percent (85%) of maximum density.
- B. Fertilizer tablets and Mycorrhizal inoculant shall be added to the backfill material in quantities as per each products manufacturer.
 - 1. Fill remaining area of planting hole with water.
 - 2. Once the water has completely drained, fill remaining area of hole with backfill mix and thoroughly tamp to eighty-five percent (85%) of maximum density. Form a six inch (6") saucer around the edge of the backfill hole by constructing a berm. The finish height of the compacted berm shall be three inches (3"). No excess soil shall be allowed to remain within the plant saucer. Fill saucer with water.

3.3 PRUNING OF NEW PLANT MATERIAL

- A. Prune each tree in accordance with the workmanship requirements of "Pruning Standards" to preserve the natural character of the plant. All pruning shall be by a certified arborist.
- B. Prune only dead, broken, badly bruised, or deformed branches, and all suckers, and in such a manner as to preserve natural character of plant.
- C. Perform all pruning with clean, sharp tools, and with cuts flush and clean. Do not apply paint or asphalt emulsion tree wound compound on cut area.
- D. Contractor to encourage apical dominance by removing one co-dominant leader as required.
- E. Pruning shall be undertaken to encourage good scaffold branching.
- F. Trees which have had their leaders cut, or so damaged that cutting is necessary, will not be accepted. There shall be no abrasion of bark, nor fresh cuts of limbs over one-half inch (1/2").
- G. All pruning shall be done in the presence of the Engineer.

3.4 WATERING

- A. The plants shall be watered immediately following planting.
 - 1. Soak the plants thoroughly again within a twenty-four (24) hour period after the initial planting.
 - 2. Establish temporary water or irrigation as required to obtain plant development, root growth and establishment.
 - 3. Water shall be furnished at the expense of the Contractor.
- B. Additional watering shall be made at least once every three weeks, unless otherwise directed, until final acceptance of the plant material.

3.5 FERTILIZING

- A. Install fertilizer packets at depth of six (6) to eight (8) inches equally spaced around the plant, as it is being backfilled. Packets shall be installed per the manufacturer's instructions. Packets shall not be cut, ripped, or damaged. The application rates for fertilizer packets shall be one packet for each inch of tree trunk caliper. As documentation of compliance with this requirement the Contractor shall provide the Owner with receipted invoice showing the project name and quantity of packets supplied.

3.6 GUYING AND STAKING

- A. Immediately after planting, stake trees as indicated on detail drawing or as directed by Owner.
 - 1. Place two stakes outside of the planting pit, exercising care not to damage the soil berm.
 - 2. Guy all trees with a caliper of two inches (2") or greater and all evergreen trees greater than four feet (4'). Guy webbing shall be attached at a point no higher than one half (1/2) the height of the tree, nor lower than one-third (1/3) the height of the tree.

3. Guy trees to each stake near top of stake and intertwine webbing at tree trunk. The guy webbing shall lay flat against the trunk. Draw guy webbing tight enough to remove slack but not enough to cause deflation or strain to the plant.

3.7 MULCHING PLANTS

- A. Application of mulch should only occur after planting operations have been completed and initial watering has taken place. Mulch shall be applied no later than forty-eight (48) hours after planting.
- B. Prior to the placement of mulch, the contractor shall apply a pre-emergent weed control within the entire area to be mulched. Pre-emergent weed control shall be applied by a commercial applicator, licensed in the state in which the work is being performed, at a rate in accordance with the manufacturer's installation.
- C. Mulch shall be applied a minimum of three (3) inches in depth for all individual trees and planting beds, as indicated graphically or verbally on the drawings.
- D. Where mulch abuts seeded lawn areas or other finish grade materials, edge of planting bed shall be cut smooth and cleanly. Mulch shall be placed carefully so as not to spill into adjacent areas. Any excess or spilled mulch shall be promptly removed from the project area.

3.8 TRUNK WRAPPING

- A. Remove all trunk wrap and trunk protection devices prior to staking and guying operations unless otherwise directed by the Owner's Representative.

3.9 ANTI-DESICCANT SPRAYING

- A. Spray anti-desiccant as directed by the manufacturer's recommendation and as approved by the Owner's Representative.

3.10 TAGS AND LABELS

- A. Leave all tree tag and label seals unbroken and visible on plant material until final inspection. Remove all seals immediately after final inspection.

3.11 PLANTING ON BANKS

- A. For planting on bank 2:1 or steeper or as directed by the Owner's Representative, apply jute mesh loosely but smoothly to fit the contour of the finished grade parallel to, and in same direction as, the flow of water. The up-slope end of each separate strip or piece of jute mesh shall be buried in a six inch (6") minimum vertical anchor slot or junction slot with the soil tamped firmly against the mesh. Where more than one width of material is required, edges shall overlap a minimum of twelve inches (12"), and the up-slope section of mesh will be on top. Down-hill ends of the jute mesh shall be folded under approximately four inches (4") and stapled into place. Staples will be inserted through the mesh along edges, overlaps, and in the center of all jute mesh strips at intervals not greater than three feet (3'). All anchor slots, junction slots, check slots, and terminal folds shall have five (5) staples spaced not more than nine inches (9") on center across widths.

1. On seeded banks, jute shall be applied immediately after seeding. On shrub banks, apply jute after finish grading. Cut openings in mesh for each plant and mulch as specified.

3.12 PRELIMINARY ACCEPTANCE

- A. After the completion of planting and all other related operations the Contractor shall make written request to the Owner for a formal inspection of the work. If plant materials and workmanship are acceptable upon inspection, written notice will be given to the Contractor stating that the work has received Preliminary Acceptance and that the Establishment Period has commenced from the date of the notice.

3.13 PLANT REPLACEMENT GUARANTEE

- A. Following completion of the Establishment Period the trees shall be guaranteed for a period of one (1) year. At the end of the guarantee period, a Final Inspection with the Contractor and Owner will be held to determine whether any plant material replacements are required.
- B. During the guarantee period the Contractor shall provide tree care as required to produce an acceptable planting at the Final Inspection. To be found acceptable at that time each tree shall have been established in place for at least one (1) year, shall show at least 75% healthy growth and shall have the natural character of its species as determined by the Owner.
- C. Trees found unacceptable or dead shall be removed promptly from the site and replaced during the specified planting season. Replacements shall be of the same species and size and shall conform in all respects to the specifications for furnishing and installing new plants. Replacements shall be maintained and guaranteed as specified for the original plantings. If, at the end of the guarantee period for the replacement planting, the replacement is not in acceptable condition, the Owner may elect to accept a credit in lieu of a second replacement.
- D. Cost of replacements shall be borne by the Contractor, except when such replacement is required due to vandalism or neglect by others.
- E. At the end of the Guarantee period the Contractor shall remove and dispose of all stakes and guys, as a condition of final acceptance and release of retainage.
- F. "Vandalism" is intended to mean: any acts, whether intentional or accidental, by other persons occurring following final acceptance which clearly result in breakage or other damage to individual plants or plant beds, and which may reasonably be considered to be beyond Contractor's reasonable control, as determined by the Owner's Representative.

END OF SECTION